A COMPARATIVE STUDY BETWEEN PATIENTS WITH ACUTE URINARY RETENTION AND WITHOUT RETENTION TO DETERMINE PREDICTORS OF ACUTE URINARY RETENTION IN BENIGN PROSTATIC HYPERPLASIA"

Submitted for M.Ch degree examination

BRANCH – IV UROLOGY

GOVERNMENT KILPAUK MEDICAL COLLEGE

CHENNAI – 600010

THE TAMILNADU DR. MGR MEDICAL UNIVERSITY

CHENNAI – 600 010.

AUGUST 2013

CERTIFICATE

This is to certify that the dissertation **titled "A COMPARATIVE STUDY BETWEEN PATIENTS WITH ACUTE URINARY RETENTION AND WITHOUT RETENTION TO DETERMINE PREDICTORS OF ACUTE URINARY RETENTION IN BENIGN PROSTATIC HYPERPLASIA"** submitted by Dr.P. VELMURUGAN to the Faculty of Urology , The Tamil Nadu Dr. M.G.R. Medical University, Chennai inpartial fulfillment of the requirement for the award of M.Ch Degree in Urology branch is a bonafide work carried out by him under direct supervision and guidance.

Prof. Dr. P.Vairavel
DGO.,M.S.,M.Ch.,(UROLOGY)
Prof. of Urology,
Department of Urology,
Kilpauk Medical College Hospital,
Chennai – 10.

Prof. Dr. C.Ilamparuthi
M.S.,M.Ch., DNB.,(UROLOGY)
Prof. of Urology
Department of Urology,
Government Royapettah Hospital,
Chennai – 14.

The Dean
Govt. Kilpauk Medical College and Hospital,
Chennai – 10.

DECLARATION

I, **Dr.P.VELMURUGAN** solemnly declare that the dissertation titled **"A COMPARATIVE STUDY BETWEEN PATIENTS WITH ACUTE URINARY RETENTION AND WITHOUT RETENTION TO DETERMINE PREDICTORS OFACUTE URINARY RETENTION IN BENIGN PROSTATIC HYPERPLASIA"** is a bonafide work done by me at Govt. Kilpauk Medical College & Hospital and Govt.Royapettah Hospital during March2012 to February 2013 under the guidance and supervision of Prof .Dr.K.THIAGARAJAN M.S., M.Ch.,DNB (Urology) , Professor of Urology.

The dissertation is submitted to Tamil Nadu, Dr. M.G.R Medical university, towards partial fulfillment of requirement for the award of M.Ch. Degree(Branch-IV) in Urology three years course.

Place: Chennai

Date: Dr. P.Velmurugan

GUIDE :
Prof.K.THIAGARAJAN M.S.,MCh., DNB(Urology)
Prof. of Urology,Govt.KilpaukMedical College , Chennai.

ACKNOWLEDGEMENT

I thank Prof. Dr. P. RAMAKRISHNAN, M.D., DLO.,The Dean, Kilpauk Medical College for granting me permission to do my Dissertation.

I thank Prof. Dr. P. VAIRAVEL, DGO.,M.S.,M.Ch.,Kilpauk Medical College for his kind guidance and advice.

I thank Prof. DR. K.THIAGARAJAN M.Ch., DNBfor his kind guidance and advice.

I thank Prof. Dr. C. ILAMPARUTHI M.Ch., for his encouragement and help.

I thank Prof. Dr.K.PITCHAI BALA SHANMUGAM M.Ch.,for his constant guidance and encouragement throughout the period of this study.

I also extend my thanks to my Assistant Professors Dr.P.LEELAKRISHNA M.Ch, Dr.R .JAYAGANESH M.Ch, Dr.G.SIVASHANKAR M.Ch, Dr.A.SENTHILVEL M.Ch and Dr.T.SRIKALA PRASAD M.Ch, for their timely help and properguidance.

I extend my thanks to Mr. PADMANABAN, statistician, Kilpauk Medical College, for his help instatistics of this study.

I am grateful to all the patients who have participated in this study.

I extend my thanks to my Senior and Junior colleagues inmy Department who helped me a lot.

I thank my family for their kind cooperation.

CONTENTS

INTRODUCTION

The natural history of Benign Prostatic Hyperplasia(BPH) is variable. One of the most significant complications that a patient with Benign Prostatic Hyperplasia can experience is Acute urinary retention (AUR).Benign Prostatic Hyperplasia is a progressive disease. This concept is being slowly accepted. Acute Urinary Retention is one of the long-term outcomes of benign prostatic hyperplasia. The exact incidence rates of acute urinary retention was uncertain till the recent past. However with the availability of population-based studies of community-dwelling men as well as those from patients diagnosed with BPH, better estimates of the incidence of AUR are currently available. The incidence rate per 1000 patient-years is less variable in the community than previously thought. This is the data inferred from descriptive and analytical studies. The estimated incidence rate is 5–25 per 1000 person-years. It is approximately 0.5%–2.5% per year. Risk is cumulative . It increases with an increase in age. The cumulative risk of AUR in a fifty year old male , with mild symptoms of BPH, if he lives to be 80 is about 20%. The risk of AUR for a sixty year old man who lives another twenty years is about 23%, and that for seventy year old man who lives another 10 years, is about 30%.

The impact that acute urinary retention can have on the quality of life is comparable to that of an of attack of renal colic.[1] Even a single episode of urinary retention is significant for a patient with BPH. It is characterized by the inability to void, increasing pain, and need for catheterization .Follow-up visits to the doctor is required with an attempt of trial voiding. If trial voiding fails, the patient may require surgery. The entire process is painful and time-consuming. The risk of recurrent retention was 56%–64% within 1 week of the first episode as per the previously available data .[2–4]

The risk of acute urinary retention is higher in a patient with BPH when compared to the general population. Several strong risk factors for AUR have been identified by analytical studies. The most important risk factor is serum prostate-specific antigen (PSA). The other risk factors are prostate volume, maximum flow rate, and symptom severity. These should be kept in mind when counselling patients with benign prostatic hyperplasia who are planned for medical management.

There has been a remarkable change in the approach and management of patients with acute urinary retention. Several factors hat can result in AUR or associated with AUR have been identified. AUR may be classified as that related to BPH or not related to BPH. It can be either spontaneous or precipitated. The management involves

urgent bladder decompression. This can be achieved by either urethral catheterization or suprapubic catheterization. All patients should undergo an attempt of trial voiding without catheter(TWOC). However a significant number of patients may not void. These patients require surgery usually within the first year of follow-up.

One of the prophylactic measures attempted to prevent AUR in men with moderate to severe LUTS and large sized prostate, is the use of 5 alpha reductase inhibitors. Alpha blockers have also been used in symptomatic BPH patients to prevent AUR. Its use can aid in voiding following catheter removal. The time of surgery after AUR can be delayed with the use of alpha blockers and in patients who is responding well, surgery can even be avoided. Anticholinergic drugs can be used in combination with alpha blockers in patient with BPH. This combination does not increase the risk of AUR. However conclusive evidence to prove reduction of risk of AUR with the use of finasteride and α-blockers is still lacking.

In the past, an episode of AUR was an absolute indication for surgery. Between twenty five to thirty percent of men who underwent transurethral resection of the prostate (TURP) in the past had AUR as their main indication for surgery.[5] At present only those patients who fails trial without catheter undergo surgery.

TURP is the treatment of choice if a patient fails trial without catheter. It is the "gold standard". Other minimally invasive procedures can be considered in poor-risk patients. The safety and efficacy of these procedures, however, is yet to be determined.

In contrast to patients presenting with symptoms only ,TURP has been found to be associated with increased morbidity and mortality in men with AUR . Delayed TURP is associated with lower morbidity and mortality than urgent intervention in a patient who had an episode of AUR. Hence , it is justifiable to attempt primary prevention of AUR especially in those patients with increased risk such as older patients, patients with severe symptoms, larger sized glands, and increased PSA levels.

AIM OF THE STUDY

To accurately determine factors that predict acute urinary retention in patients with benign prostatic hyperplasia by comparing patients presenting with acute urinary retention to patients without retention.

REVIEW OF LITERATURE

Epidemiology of AUR in BPH

Several population-based, observational and placebo-controlled studies of AUR in BPH are available. The results of these studies can be analyzed descriptively as well as epidemiologically.

Descriptive Epidemiology

The occurrence of AUR was in the range of 4-15 to one thirty per thousand person-years as per previous estimates. This was calculated by Jacobsen and colleagues[6] based on studies by Birkhoff et al,[7] Ball et al,[8] and Craigen et al,[9]. These studies gave a ten year cumulative incidence rate of four to seventy three percent. In a cross sectional study of Spanish men published in 2002, the self-reported rate of AUR was five percent.[10]

Recent data of AUR in BPH from controlled studies in better-defined populations are available. In the Veterans Association Cooperative study, AUR occurred in one man after TURP . It was noted in eight of 276 patients in the watchful waiting arm during a three year follow up period. The incidence rate of AUR in this study was 9.6 per thousand person-years.[11]

Five hundred men with BPH were studied by Barry and colleagues. These men chose to undergo conservative treatment inspite of being candidates for surgery as per established criteria.[12] In 1574 person-years, during a four year follow up, forty episodes of AUR were observed. The incidence rate of AUR was twenty five per thousand person-years, in this study.

The Physician's Health Study observed that in 15,851 person-years of follow-up, eighty two men developed acute urinary retention. The incidence rate for AUR in this study was 4.5 per thousand person-years .[13]

2115 men between the ages of forty and seventy nine were followed in the Olmsted County Study.During 8344 person-years of follow-up , fifty seven had their first episode of AUR. The incidence of AUR as per this study was 6.8 per thousand person-years .[6]

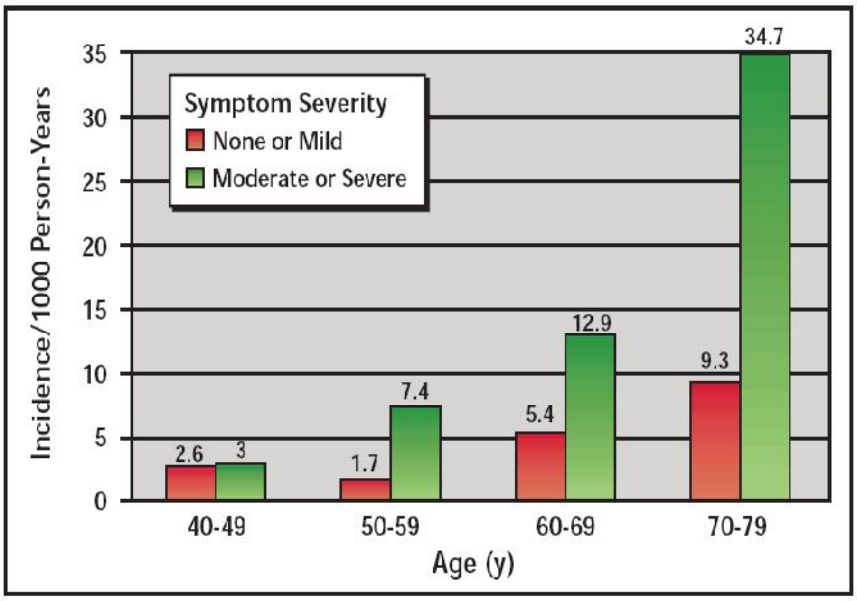


Fig 1 – Olmsted County Study done by Jacobsen et al[6] –showing Incidence rates of acute urinary retention as per age and severity of symptoms

The Proscar Long-Term Efficacy and Safety Study (PLESS)[14] followed 1376 men for four years. These men with enlarged prostates and moderate symptoms were treated by placebo. AUR was noted in ninety nine of these men. The incidence of AUR as per this study was eighteen per thousand person-years.

Ameta-analysis of threestudies with a similar number of enrolled patients (2109 patients) was carried out by Andersen and colleagues . These studies involved a two year follow up of patients with BPH treated with placebo. Of the population studies , fifty sevenhad AUR. In this meta analysis, the incidence rate was fourteen per thousand person-years .[15]

Table 1 showing various studies with incidence rates of AUR

Reference	Study group Description	No. of Cases	No. of Cohorts	Follow up period	% over all	% per year	Incidence rate per1000 Years
Birkhoff et al[7]	Watchful waiting study	10	26	3	39%	13%	130
Ball et al[8]	Watchful waiting study	2	107	5	1.9%	0.37%	3.7
Craigen et al[9]	Watchful waiting study			-		-	15
Hunter et al[10]	Self-reported Prior events In spanish men	102	2002	-	5.1%	-	50.9
Wasson et al[11]	Turpvs Watchful waiting Va-coop	8	276	3	2.8%	0.9%	9.6
Barry et al[12]	Prostatectomy Candidates	40	500	4	8%	2.5%	25
Meigs et al[13]	Physicians' Health study, Self-reported	82	6100	3	1.3%		4.5%
Mcconnell et al[14]	Placebo group Of pless study	99	1376	4	7.2%	1.8%	18
Andersen et al[15]	Placebo groups Of 2-year Bph studies	57	2109	2	2.7%	1.35%	13.5
Jacobsen et al[6]	Community Cohort 40–49 Years old	57	2115	4			6.8

Analytical Epidemiology

The risk factors for Acute Urinary Retention can be determined with the help of these studies.

The Physician's Health Study showed that the rate of AUR increased with increasing age of the patient and baseline symptom

severity [13]. Theincidence of AUR was observed to increase from 0.4 per thousand person-years in patients in the 45–49 year age range to 7.9 per thousand person-years in patients in the 70–83 years age range.These patients had mild LUTS at the time of presentation.The highest risk of AUR was in those patients a symptom score of eight or more.The age-adjusted incidence in this group was 13.7 per thousand person-years. The risk of AUR was individually predicted by all the seven lower urinary tract symptoms (LUTS) that comprise the American Urological Association symptom index .The symptoms with most independent prediction of risk for AUR were the feeling of incomplete bladder emptying, having a weak urinary stream and the desire to void again within two hours of the last act.

The association with age, severity of symptoms , prostate volume and maximum flow rate was analysed in the Olmsted County Study[6]. The incidence rates per thousand person-years was noted to increase from 2.6 in the fourth decade to 9.3 in the seventh decade for men with mild symptoms. It was observed to increase from 3.0 to 34.7, in those patients with moderate or severe symptoms. The relative risk for AUR increased for older men and in those with moderate to severe symptoms (3.2 times). The risk was also noted to be higher (3.9 times) in those with a flow rate below twelve mL/sec . In those with a prostate volume

of more than thirty mL as pertransrectal ultrasound, the risk was three times higher. The baseline risk was 1.0 x for the corresponding groups.

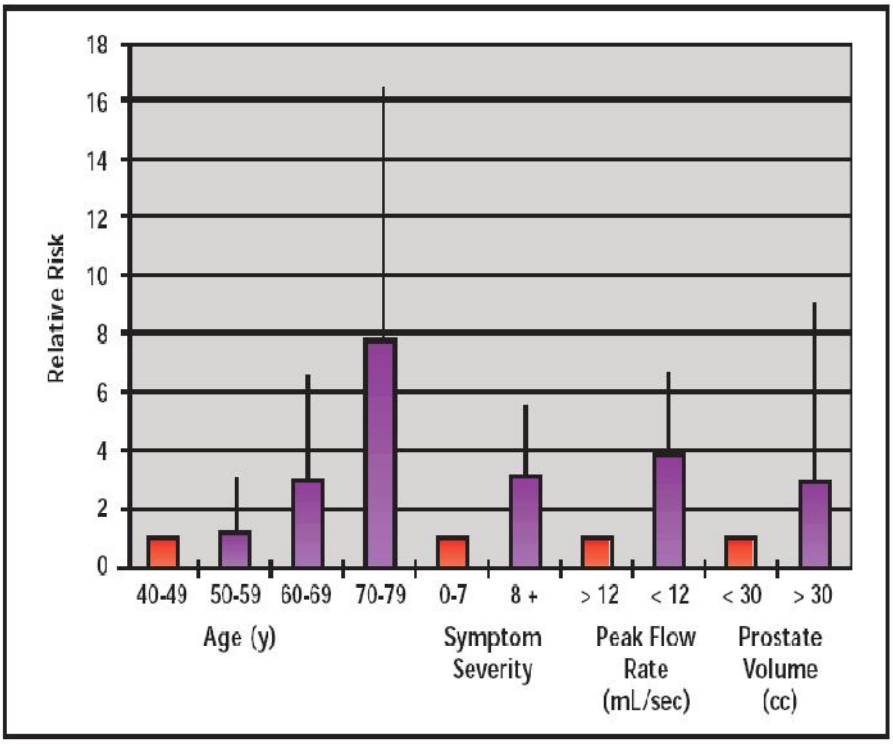


Fig 2 – Olmsted County Study ; Jacobsen et al [6]: relative risks of AUR as per age and severity of symptoms,prostate volume and flow rate.

A questionnaire-based study from Germany evaluated 5404 men between the ages of fifty to eighty years. 1.9% incidence of AUR was noted in the first year of follow up.[16] There was good correlation of incidence with age and symptom severity.The incidence rate was 0.8% for men between the ages of fifty to fifty nine years. It wasone percent for those in the 60–69 years age range .For patients above 70 years, the incidence was 2.5%. The incidence rate of AUR for those with mild symptoms was about 0.7% and with moderate symptoms it was about

2.4% , where as in patients with severe symptoms it was about thirteen percent respectively.

An observational study of three hundred and thirty one men with BPH was carried out. Of those studied , the initial presentation was that of AUR in sixty four patients.[17] No significant differences in terms of age, symptoms, and quality of life was observed in the two groups. However, in the patients with AUR, the transition zone volume and the total volume of the prostate were significantly higher. There was also a significant difference in the ratio of transition zone to total prostate volume (transition zone index). This was 0.716 in the AUR group andabout 0.416 in the non-AUR group ($P < .001$). The amount of tissue resected was also stastically significant in those with and without AUR (30.0 ± 29.8 SD vs 22.8 ± 26.7 SD cc; $P < .01$). This was demonstrated bySaboorian and colleagues who studied ninety men with AUR and eighty seven men without AUR.[18] The levels of serum prostate-specific antigen prior to surgery was also found to be significantly different in the two groups (6.5 ± 5.5 SD vs 4.5 ± 4.6 SD; $P < .001$).

The risk of AUR was related to the prostate volume, symptom severity and serum PSA as shown in the PLESS study [14,20,21] . The same was also observed in three placebo driven two year studies [19].The incidence of AUR was found to increased from 5.6% in patients with

mild symptoms and PSA of less than 1.4ng/ml to 7.7% in men with severe symptoms and similar PSA level. In patients in the PLESS study with serum PSA more than 1.4ng/ml the risk of AUR increased from 7.8% to 10.2% during the four years of follow up.[20] In the two year studies, the rate of AUR was noted to be eight fold greaterif the serum PSA was more than 1.4 ng/mL (0.4% vs 3.9%). The risk was three times greater if the prostate volume was more than forty ml (1.6% vs 4.2%).[19]

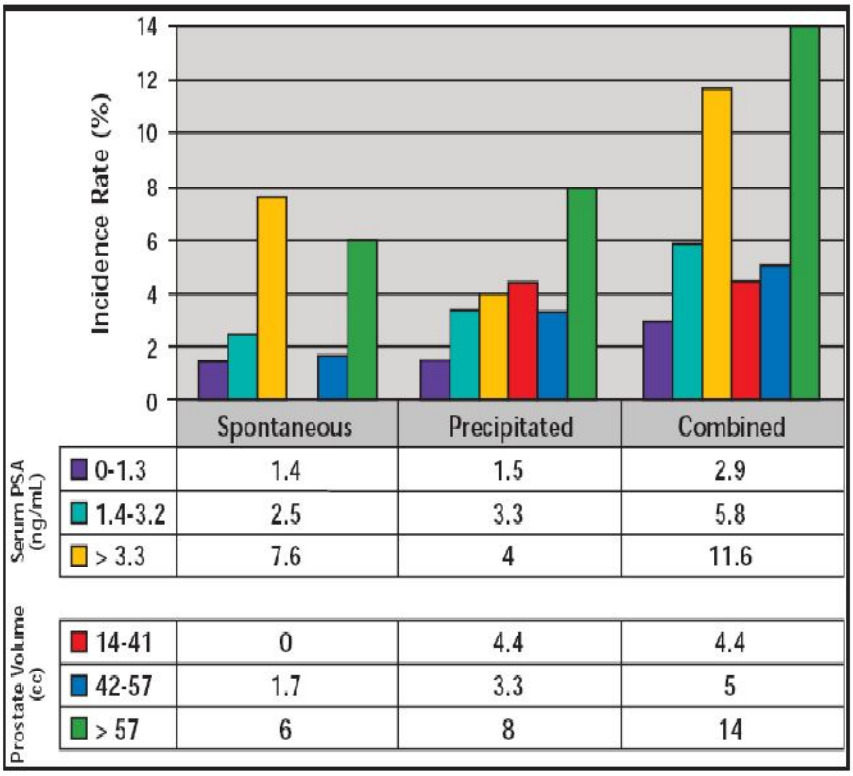


Fig 3 .Results of PLESS. incidence calculated over 4 yearsand stratified bytertiles of prostate volume serum prostate-specific antigen (PSA) at baseline.

Over hundred possible outcome predictorsof AUR were analyzed alone or in combinations. This analysis revealed that levels of serum PSA alonewas superiorwhen compared with the combination of serum

PSA, symptom problem index, voiding within two hours of the last act , hesitancy and maximum urinary flow rate in predicting an episode of acute urinary retention.[22]

Mechanism of AUR may be due to 1. disruption of bladder innervation (spinal cord injury, diabetes mellitus) 2. any condition which leads to the overdistension of bladder.(alcohol ingestion) 3.Also ,urinary flow can be restricted by any event which narrows the urethral lumen,thereby causing resistance to the flow (BPH,stricture urethra) .In BPH , the main mechanism which precipitates AUR has not been fully evaluated.However followingfactors may be considered

Etiology of AUR.

1.Prostatic inflammation - The first episode of AUR usually occurs following an event of prostatic inflammation . Kefi et al. reported,patients who presented with LUTS only had 29% of prostatic inflammation when compared to men with AUR who had only 54.7%.[23.] MTOPS study, concluded that baseline prostate biopsies done among 1,197 patients showing , acute inflammatory changes in 544 patients and chronic inflammatory changes in 513 patients. Prostatic inflammation were predominantly found to be associated with patients having increased PSA values and also large sized glands.Both increased

size of prostate and raised PSA levels were considered as predicting factors for AUR in BPH. These patients also have rapid progression of symptoms and are more likely to undergo surgery when compared with those who had no inflammation.[24]The cause for inflammation in BPH resected specimens has not been clearly identified. The presence of large amount of CD4(+) T lymphocytes may suggest the possibility of autoimmune etiology.This was also confirmed by increased levels of inflammatory cytokines which are released by smooth muscle cells and T cells .These cytokines are interleukin 15 (IL-15) and interferon gamma (IFN-gamma).[25]

2.Prostatic infarction[26] - Infarction of prostate may cause AUR. This was confirmed by the study conducted by Spiro and colleaguesl.[27]They compared the prostatectomy specimens between patients with AUR and those with symptoms alone.Theyfound that 85% of prostates removed for AUR showed infarction where as it was only 3% in patients with symptoms alone.Infection , trauma following instrumentation,compromising intraglandularblood supply all can cause prostatic infarction .The exact mechanism by which prostatic infarction causing has not been determined. A proposed model for AUR due to prostatic infarction by Abeshouse et al[28] may be the following

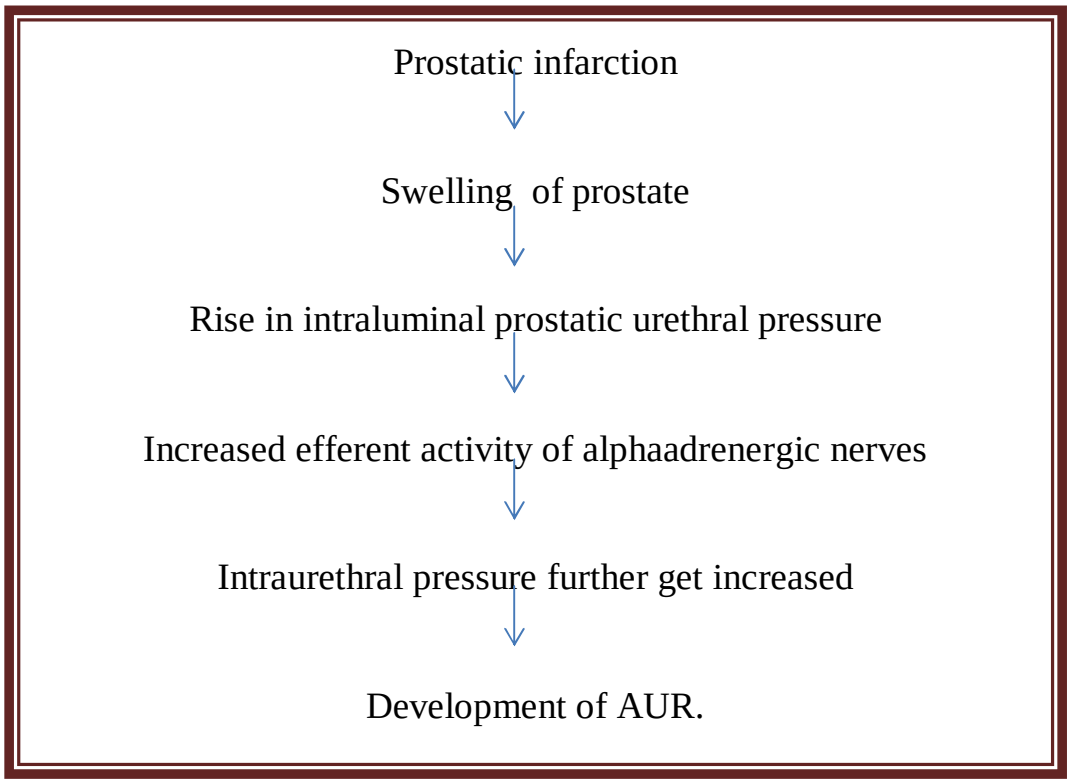


FIG 4 - Prostatic infarction – etiology of AUR

Anjum and colleagues done similar study comparing the prostatectomy specimens of thirty five men with AUR and thirty five men without urinary retention. They found that three percent of men with AUR showed infarction of prostate and it was only 1.9% men showed infarction without retention[29]. In contrast,study conducted by Jacobsen et al does not any infarction in six prostatectomy specimens of men with AUR.[30]To know the exact role of prostatic infarction as a cause for AUR , conclusive studies are pending.

3.Alteration in Stromal and Epithelial ratio -A prospective controlled trial of clinico-pathological study compared the specimens

retrieved from patients with AUR and patients with refractory lower urinary tract symptoms only . Both the groups had equal number of patients of about 35 in each.This study showed that patients with acute urinary retention had increased epithelial component of about 71% ,when compared with patients with symptoms only who had only about 60% . The alteration in ratio of epithelial and stromal growth may cause disruption in the blood supply of the gland ultimately resulting in infarction of prostate and finally causing acute urinary retention.Finasteride , 5 alpha reductase inhibitor has its action mainly on the epithelial component of the prostate gland. Its use found to decrease the incidence of acute urinary retention .This supports the fact that alteration in Stromal and Epithelial ratiowith increased epithelial component may cause AUR.

4.Genitourinary instrumentation - Acute urinary retention can be caused by any of the diagnostic procedures like cystoscopy, ureteroscopy ,prostatic biopsy in the immediate post operative period. This is usually due to irritation to genitourinary tissues and also sometimes by hematuria. The incidence of acute urinary retention has been decreased after the use of flexible cystoscopy. This may be due to the fact that flexible cystoscopy causing less trauma to the genito urinary tissues and also lesser irritation.Bigger sizedtru-cut needles

used in trans rectal biopsy of prostatemay cause acute urinary retention.This is usually due to the traumatic insult to the prostatic tissues with hematoma and swelling causing urinary retention.Sometimes associated hematuriawith clots can also cause urinary retention. Smaller sized needles used under TRUS guidance rarely produce acute urinary retention .[31] AUR following ureteroscopyis usually due to bladder irritation.

5.Postoperative AUR -The presence or absence of BPH does not alter the occurrence of AUR in the post operative period.[32]Anesthesia, analgesia, pain , suppressed consciousness ,intravenous fluids all may cause postoperative AUR. An intravenous infusion of more than 0.75 liter and advanced age are found to be the better predictors of AUR in post operative period. This was proposed by Hawa et al.

6.Constipation - In the absence of scarce fecal impaction, neurological disease,or bladder outlet obstruction ,constipation may also be considered as a cause for acute urinary retention. Alfuzosin in Acute Urinary Retention (ALFAUR) study conducted with , 363 BPH patients presenting with AUR. Thorough history of daily bowel habits was taken from all the patients. The study concluded that results of trial of voiding whether failed or successful ,does not depends on the

constipation history.However patient with constipation are at increased risk for recurrent episodes of urinary retention and may need surgical intervention for BPH.

7.Stroke (CVA) - Impaired bladder emptyingis one of the neurological sequelae of stroke which can precipitate AUR.

8.Alcohol ingestion -Central nervous system suppression and also fluid overload ,both combined together may cause acute urinary retention.

The presence or absence of BPH does not alter the occurrence of AUR in stroke and also in alcohol ingestion.

9.Drugs- Anti cholinergic drugs ,by detrusor relaxation and alpha agonists , by increasing bladder outlet resistance will cause urinary retention. Drugs used for depression, allergies ,Parkinson's disease cause AUR by anticholinergic actions. Drugs used over-the-counter cold remedies have alpha-agonists as their common component also cause retention.

As per Athanasoupolos et al. inurodynamically proven bladder outlet obstructed patients,tolterodine can safely administered along with alpha antagonist , without developing of urinary retention.[33] Reynard et al. concluded that anticholinergic drugscan be safely used in BPH

patients .they also stated that the risk of developing urinary retention is very meagre and only effect that patients had was minimal raise in post-void residual urine volume.[34]The ideal situations where anticholinergic drugs is of use in BPH ,are that patients with more irritative LUTS and low post-void residual urine volume.

Non-steroidal anti-inflammatory drugs (NSAIDS) -Contractionsof detrusor muscle is also caused by prostaglandin (PGE2).NSAIDs inhibit prostaglandin synthesis (PGE2),and cause urinary retention.[35]

According to a population-based and case control study done in men >45 years in Netherlands ,current users of NSAIDs had a 2.02 times increased risk of developing urinary retentionwhen compared to nonusers. The highest risk is for patients who have started taking NSAIDs recently. The dose may be eitherequal or higher than the recommended daily dose. However there was no association noted between past use of NSAIDs and AUR.

10.Urinary tract infection (UTI) - Infection causes acute inflammation and oedema of the bladder mucosa. mucosal ‘thickening’ can lead to urinary retention. This may resolve once the infection is treated appropriately with antibiotics.

Urinary tract infection may precipitate or complicate AUR.Urinary tract infection may also arise due to poor bladder emptying secondary to BPH . Voiding function should be assessed thoroughly when a man presents with UTI and AUR .

11. Bladder overdistension,[36] a.regional anesthesia, b.prolongedlabourc.long duration surgery. In all of the above conditions,urinary retention is usually undiagnosed and also incompletely treated. This will result in prolonged overdistended bladder in a short duration. This ultimately cause temporary neurogenic detrusor decompensation (myogenic bladder damage) . Bladder sensation is also affected,either decreased or absent . In these patients retention symptoms are obscured and treatment is also not started promptly .

12.Excessive fluid intake - An enlarged prostate can lead to bladder outflow obstruction by occluding the urethral lumen. Acute painful urinary retention can occur in men with enlarged prostate when they drink large amount of fluids or refrains from emptying his bladder for a longer period than usual. This may be due to stretching of the detrusor muscle and combination of poor detrusor muscle function and outflow obstruction lead to AUR.

13.Bed-rest[37] - Decreased mobility and increased bed rest – may be considered one of the reasons for post operative urinary retention.

14 .Sexual activity,

15. Debility,

'Spontaneous' vs 'Precipitated' AUR - AUR can be classified in to spontaneous and precipitated.Although this classification is helpful in assessing the prognosis of patients clinically,this is not followed routinely.

AUR Precipitated type- the inability to void which is usually associated with a triggering event,

1. treatment of drugs with anticholinergic or sympathomimetic actions,
2. pelvic surgeries, non prostate related surgeries,
3. following anesthesia, or

AUR spontaneous type – urinary retention occurring with out any triggering events .[21,38]

The prognosis and treatment results of AUR patients can be easily determined by this classification. When comparing both the types ,15% of men in spontaneous AUR type, experienced second event of

retention, whereas it was only 9% in precipitated type. Also 75% of men underwent surgery in spontaneous type, whereas it was only 26% in precipitated type.[21]

In all cases of AUR ,initial evaluation involves the exclusion of BPH as a cause for retention. Although in majority of patients , BPH is the cause,patient should be offered an alpha blocker followed by trial voiding without catheter after a period of three to five days.

In both types of urinary retention ,whether BPH is considered as a cause or associated factor ,initial treatment option is the same for both types (offered an alpha blocker followed by trial voiding without catheter).However in precipitated type, the factor which had precipitated found to alter the long term result, hence it should also be properly given importance in long term management.[39]

AUR – Predicting factors

In BPH, the predicting factors for AUR can be categorized in to baseline and dynamic variable factors.

Base line variable factors are -

1.advanced age

2.lower urinary tract symptom severity

3.decreased peak flow rate

4.raised post void residual volume of urine(PVR)

5.enlarged prostate6. Increased PSA level

7.previously conservatively treated AUR

Dynamic variable factors are

1. > 4 points deterioration of IPSS,

2.during treatment , worrisome score >3 points

3.raising post void residual volume of urine(PVR)

4.refractory to alpha blockers

For patients who are on conservative treatment (watchful waiting or taking drugs)the above dynamic variable factors must be closely evaluated. This can help to predict which group of patient will go in for retention and those who are at risk advised to undergo surgical intervention. [40]

MATERIALS AND METHODS

STUDY GROUP: All men presenting with LUTS, with and without retention, clinically and radiologically diagnosed to have BPH , attending urology OPD and inpatients at GKMCH and GRH beween March 2012 – Feb 2013 were included in the study.

STUDY DESIGN: Prospective observational analytical study.

INCLUSION CRITERIA:

1. Patients in the age group between 49-85 years.
2. Clinically and radiologically diagnosed BPH patients.
3. Patients presenting with spontaneous AUR .

EXCLUSION CRITERIA:

1. Patients with post spinal injury, spinal degenerative and disc prolapse diseases.
2. Patients presenting with precipitated AUR .
3. Patients with stone disease
4. Patients with carcinoma prostate

This is a prospective observational analytical study conducted at GKMCH/GRH from March 2012 to Feb 2013. The study was approved by instituitional ethical committee and all men gave written informed

consent. 63 patients were enrolled in the study. Among them,32 patients presented with AUR and 31 patients presented with LUTS only. The diagnosis of BPH in all patients were confirmed clinically and radiologically. All patients age, comorbid illnessess, previous history of AUR were recorded.

Symptoms were assessed with IPSS grading (0 – 35). mild : 0 – 7,moderate : 8 -19 , severe : 20 -35. All patients had moderate to severe symptoms. The patients with AUR were asked to record their symptoms for one month before urinary retention. Digital rectal examination(DRE) was done to grade the prostate size clinically. Depending upon the length of the prostate that encroaches in to the rectal lumen(vertical prominence)[41], prostatic enlargement graded as follows,

Tab 2- size grading by DRE.

SIZE	**DIGITAL RECTAL EXAMINATION**
Normal	Encroaches 0 to 1 cm rectal lumen
I	1 to 2 cm
II	2 to 3 cm
III	3 to 4 cm
IV	>4 cm

On DRE, apart from grading of enlargement, consistency, symmetry of the prostate gland, presence or obliteration of median furrow and lateral sulci were assessed. The presence of nodules were also recorded.

USG study was done transabdominally to estimate prostate size, bladder wall thickness (BWT)and intravesical protrusion of prostate (IPP). Prostate size was calculated using prostate ellipsoid formula- $\pi/6$ × anteroposterior(AP) × transverse (T) × sagittal(S)diameter. Depending upon the size of enlarged prostate, ultrasound grading can be as follows,[41]

Tab 3 - USG - SIZE GRADING

NORMAL	**<20 gm**
I	20 – 40 gm
II	40 – 60 gm
III	60 – 90 gm
IV	>90 gm

Bladder wall thickness was measured by USG, keeping the probe suprapubically from the anterior wall of the bladder in a partially filled bladder with 150 ml .

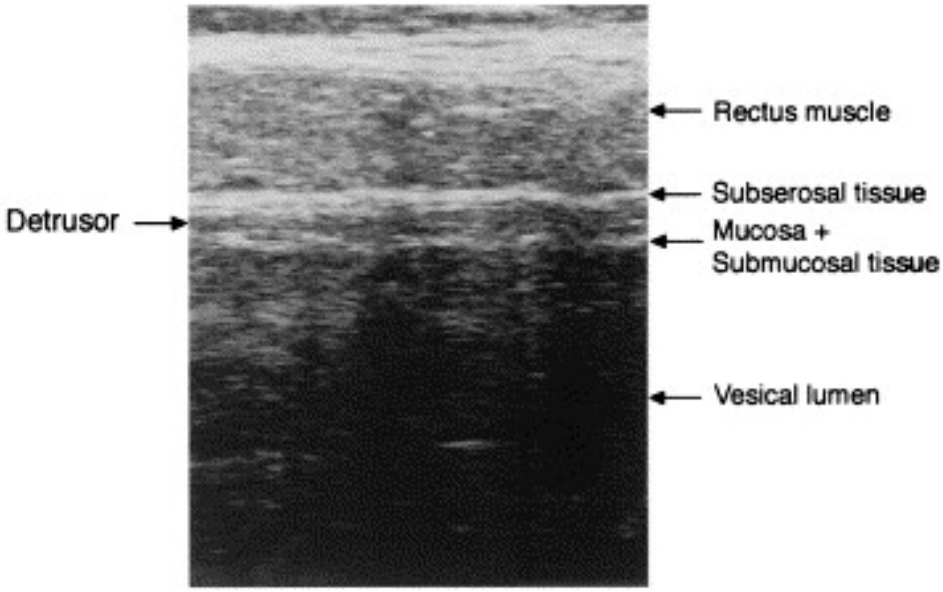


Figure 5 - Measurement of bladder wall thickness

The degree of intravesical protrusion of prostate(IPP) can be graded by measuring from the tip of the protruding prostate perpendicularly to the circumference of the bladder at the base of the prostate gland 42.

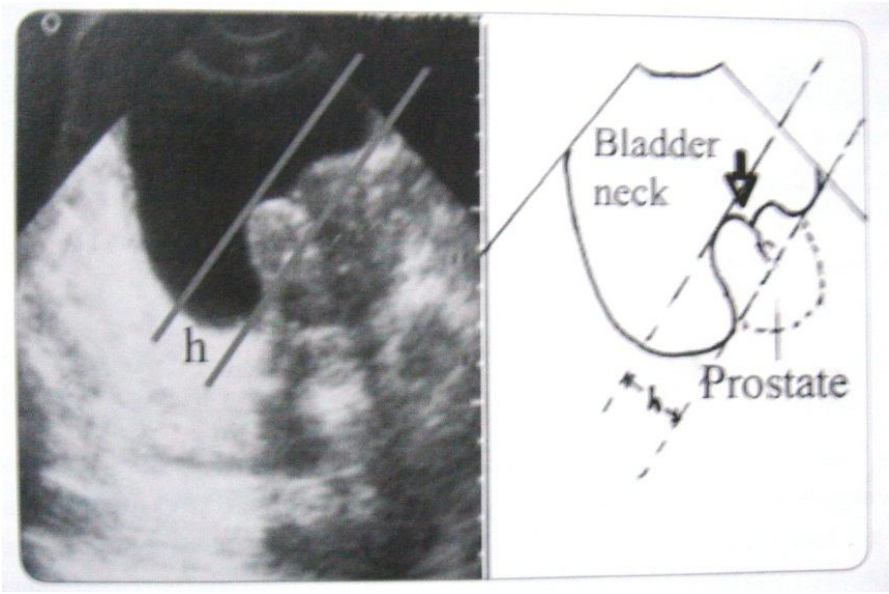


Figure – 6 - Measurement of intravesical projection of prostate in USG STUDY

Depending upon the length of intravesical protrusion of prostate , gradings are as follows .

Grade 1	<5mm
Grade 2	5-10 mm
Grade 3.	> 10 mm

Table 4- intravesical protrusion (IPP)grading

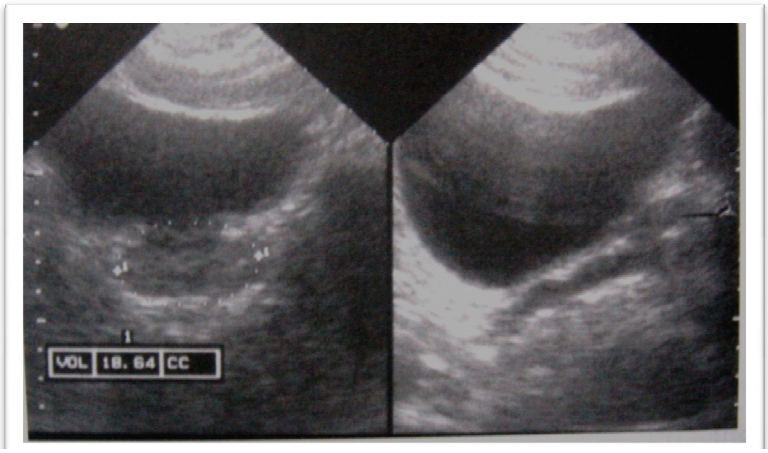


Figure – 7 - USG PICTURE - No intravesical projection

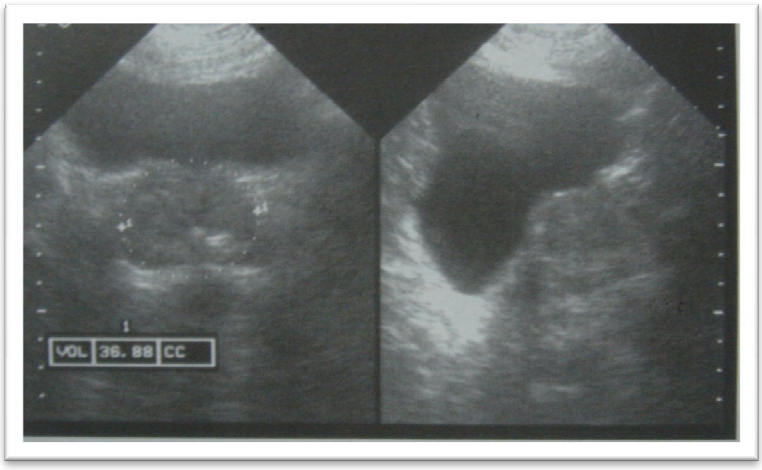


Figure – 8 - USG PICTURE – GR I (< 5mm) intravesical projection

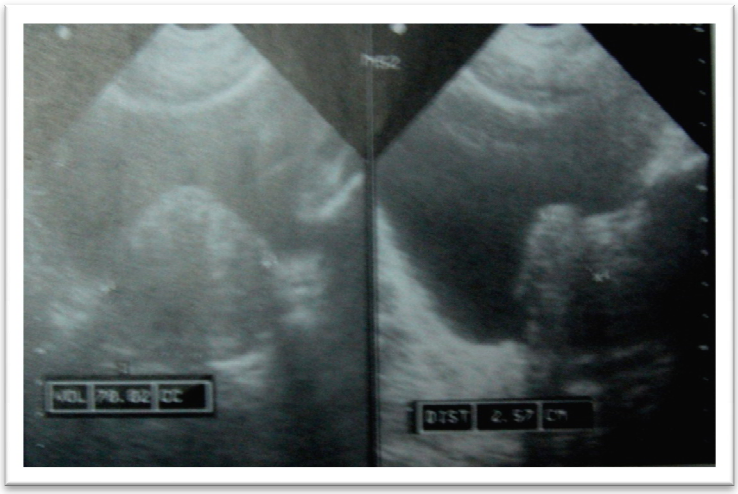


Figure 9 - USG PICTURE - GR II (5 – 10 mm) intravesical projection

Figure 10 - USG PICTURE –GR III (> 10 mm) intravesical projection

Routine haemogram and blood biochemistry were performed. Urine analysis / urine culture and sensitivity was done by collecting mid stream samples in non –AUR group and samples were collected directly from urethral catheter in AUR group patients.

Sr. PSA assessed with immunoradiometric assay. Samples were taken in OP clinic or in the patients ward before insertion of the catheter. If patient presents to our clinic with inserted catheter, latest PSA done at OP clinic were used for comparison .In suspicion of Carcinoma prostate – transrectal biopsy were performed. Patient with biopsy proved Carcinoma prostate, were excluded from the study.

The mean, Standard deviation, minimal, maximal values were calculated and the baseline parameters values in AUR/non AUR groups were analysed usingstudent unpaired t test. All discrete variables were analysed by Chi Square test. All data were analysed using SPSS computer program and $p < 0.05$ was considered statically significant.

OBSERVATION AND RESULTS

We planned to compare the following factors between AUR/ nonAUR groups.

1.Age ,2.comorbid illnesses,3.previous history of urinary retention,4.IPSS symptom severity and grading ,5. Prostate size grading as per digital rectal examination (DRE),6.size of prostate as per ultrasound study ,7.thickness of bladder wall(BWT)by ultrasound ,8.intravesical protrusion (IPP) grading by ultrasound ,9. serum PSA level and 10.presence of urinary tract infection.

In our study among the 63 patients,2 patients in AUR group (one having treatment with antidepressants, one with neurogenic bladder dysfunction) and one in non AUR group (who had biopsy confirmed carcinoma prostate) were excluded.

Statiscal package for social sciences,version 12.0.2 (SPSS, inc ,Chicago, USA)was used for statistical analysis.level of significance was considered with the p value of < 0.05.

1.AGE DISTRIBUTION Tab 5 - Crosstab – Age distribution

			AUR		
			0 –NO	**1 - YES**	**Total**
AGE GROUP	0	Count	1	1	2
		% of Total	1.7%	1.7%	3.3%
	1	Count	13	12	25
		% of Total	21.7%	20.0%	41.7%
	2	Count	7	10	17
		% of Total	11.7%	16.7%	28.3%
	3	Count	9	5	14
		% of Total	15.0%	8.3%	23.3%
	4	Count	0	2	2
		% of Total	.0%	3.3%	3.3%
	Total	Count	30	30	60
		% of Total	50.0%	50.0%	100.0%

Chi-Square Tests – 3.712 p 0.446 NOT SIGNIFICANT.

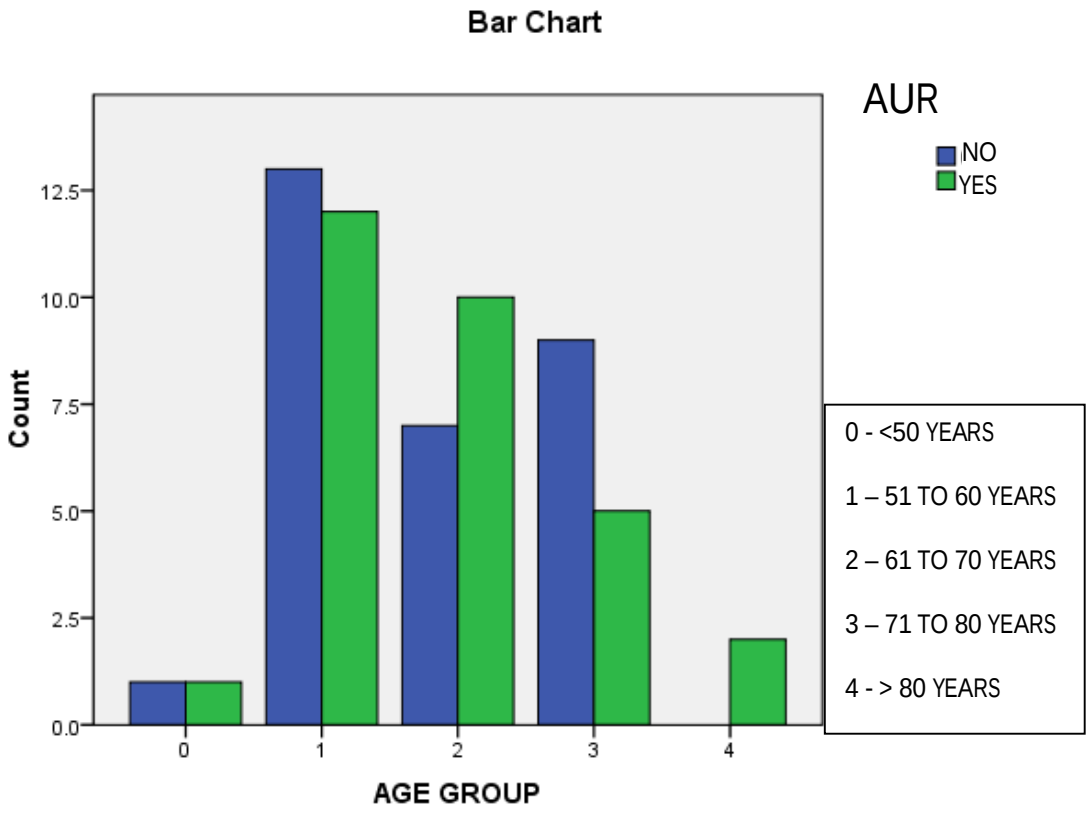


Figure – 11 – Age distribution

Most of the patients in both groups belong to 51 – 60 years age group .

AGE GROUP:

Tab 6 - T TEST-Group Statistics

	AUR	N	Mean	Std. Deviation	Std. Error Mean
AGE	1 – yes	30	64.23	8.889	1.623
	0 – no	30	64.83	8.518	1.555

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	Df	Sig. (2-tailed)
AGE	Equal variances assumed	.105	.747	-.267	58	.790
	Equal variances not assumed			-.267	57.895	.790

T - 0.267 p 0.790 NOT SIGNIFICANT.

Both groups were matched for appropriate age. The mean age for AUR group was 64.23 years and for non AUR group was 64.83.

There was no statistical significance between the various age groups between AUR and non AUR group as shown by p 0.79.

2.COMORBID ILLNESSES

TABLE 7 – DISTRIBUTION OF COMORBID ILLNESSESS

			AUR		
			0 – NO	**1 – YES**	**Total**
Comorbid	0	Count	14	12	26
		% of Total	23.3%	20.0%	43.3%
	1	Count	2	6	8
		% of Total	3.3%	10.0%	13.3%
	2	Count	6	2	8
		% of Total	10.0%	3.3%	13.3%
	3	Count	4	6	10
		% of Total	6.7%	10.0%	16.7%
	4	Count	1	0	1
		% of Total	1.7%	.0%	1.7%
	5	Count	1	2	3
		% of Total	1.7%	3.3%	5.0%
	6	Count	1	1	2
		% of Total	1.7%	1.7%	3.3%
	7.	Count	1	1	2
		% of Total	1.7%	1.7%	3.3%
	Total	Count	30	30	60
		% of Total	50.0%	50.0%	100.0%

Chi-Square Tests – 5.887, p 0.553, NOT SIGNIFICANT.

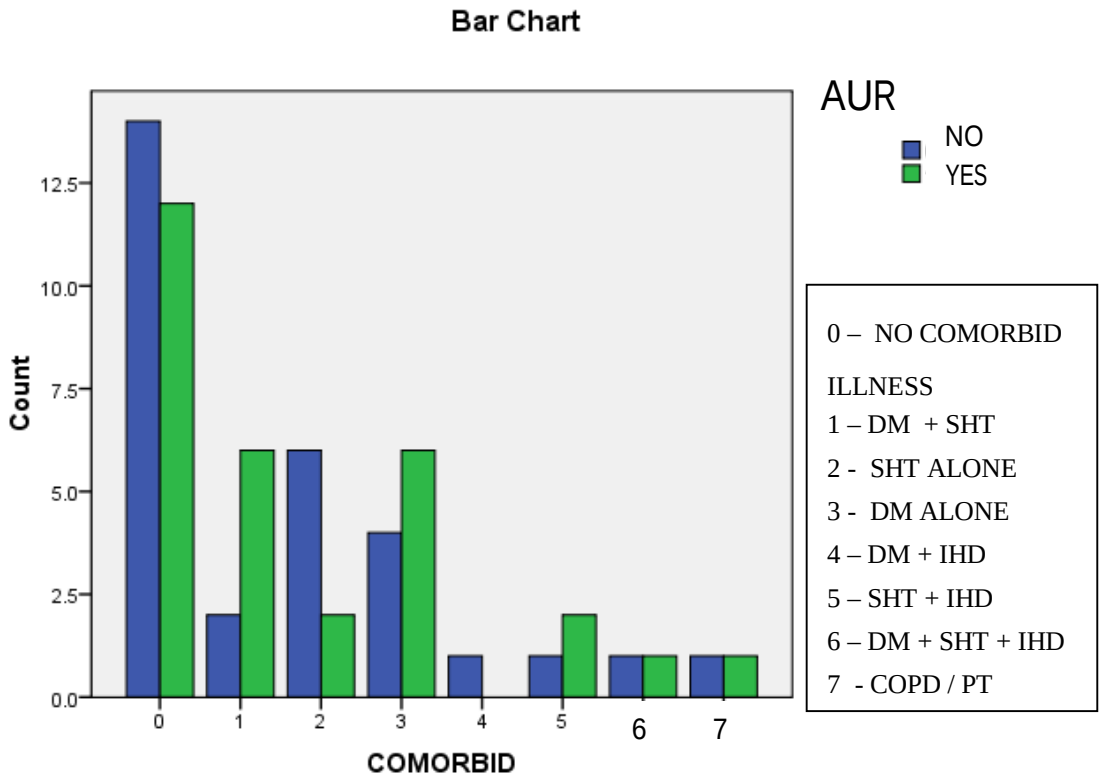


Figure 12 – Distribution of comorbid illnessess

Most of the patients in both groups have no associated comorbid illnesses.

There was no statistical significance in concern with presence of any of the comorbid illnesses diabetes mellitus, systemic hypertension, ischemic heart disease, COPD, pulmonary tuberculosis between the AUR/nonAUR groups, as shown by p 0.553.

4. PREVIOUS AUR EPISODES

TABLE 8 – Crosstab for prior AUR

			AUR		
			0 –NO	**1 –YES**	**Total**
PREVIOUS AUR EPISODES	0-NO	Count	28	20	48
		% of Total	46.7%	33.3%	80.0%
	1-YES	Count	2	10	12
		% of Total	3.3%	16.7%	20.0%
	Total	Count	30	30	60
		% of Total	50.0%	50.0%	100.0%

Chi-Square Tests - 6.667, p 0.010 STATISTICALLY SIGNIFICANT.

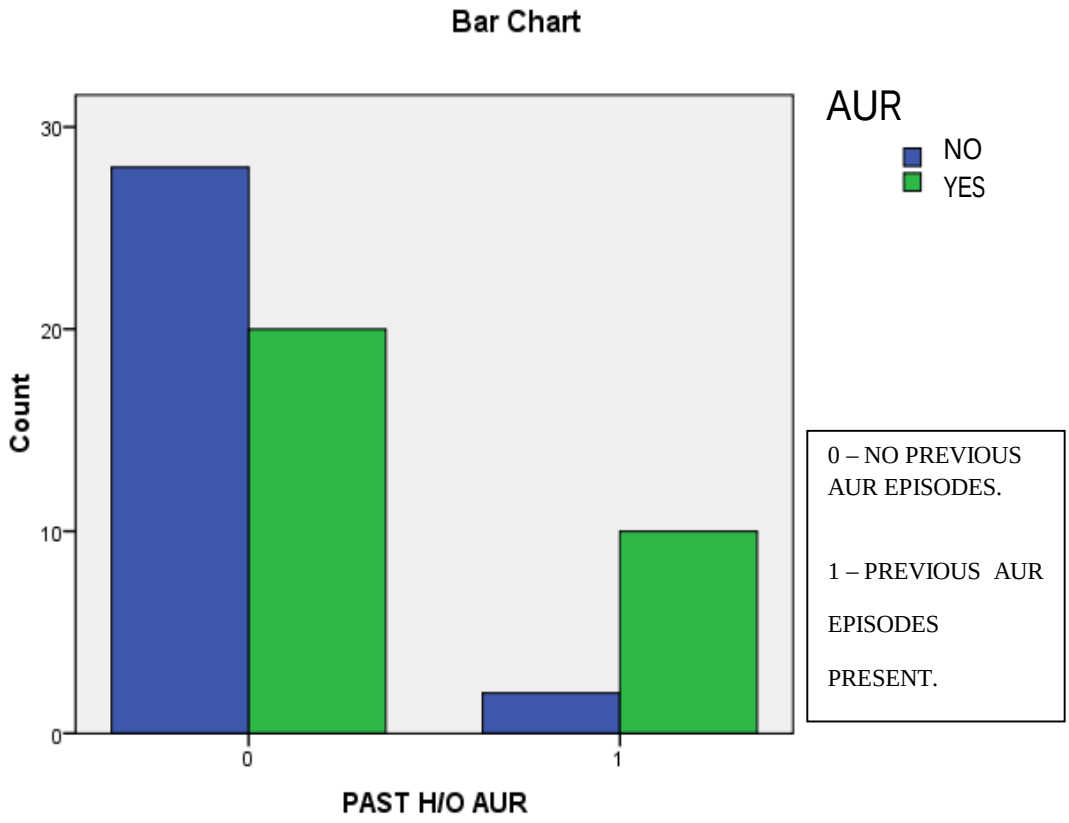


Figure 13 – Prior AUR association

Eventhough most of the patients in both groups had no previous AUR episodes,

There exists a statistical significance between AUR and non AUR groups with respect to past history of urinary retention with a p 0.010.

5. IPSS-GRADE

TABLE 9 – Crosstab for IPSS severity

			AUR		
			0 -NO	**1-YES**	**Total**
IPSS-GRADE	2	Count	27	21	48
		% of Total	45.0%	35.0%	80.0%
	3	Count	3	9	12
		% of Total	5.0%	15.0%	20.0%
	Total	Count	30	30	60
		% of Total	50.0%	50.0%	100.0%

Chi-Square Tests – 3.75 ,p 0.053 NOT SIGNIFICANT.

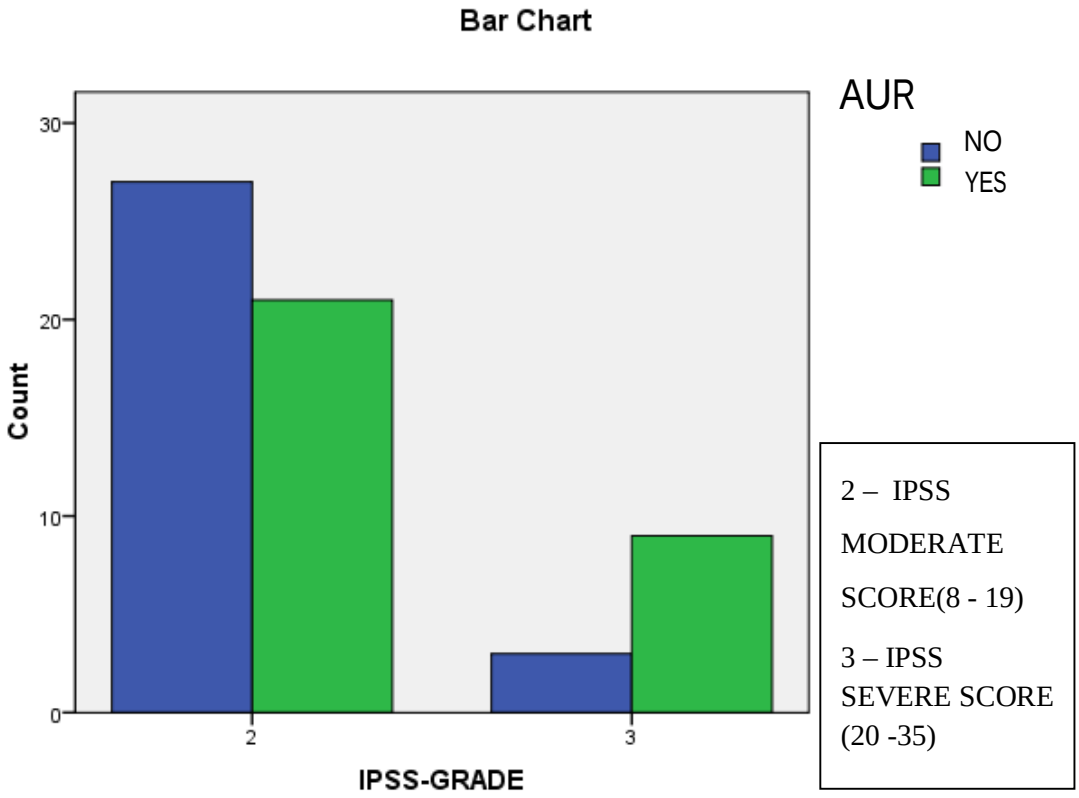


Figure 14 – IPSS severity distribution

Most of the patients in both groups presented with moderate IPSS score(8 -19)

T TEST - TABLE 10 -Group Statistics

	AUR	N	Mean	Std. Deviation	Std. Error Mean
IPSS	1 – yes	30	20.60	5.709	1.042
	0 – no	30	15.30	3.064	.559

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	T	df	Sig. (2-tailed)
IPSS	Equal variances assumed	12.845	.001	4.480	58	.000
	Equal variances not assumed			4.480	44.429	.000

T 4.48 .p 0.000 STATISTICALLY SIGNIFICANT .

Mean IPSS score for AUR group was 20.6 and for non AUR group ,15.3 with a statistical significance , p 0.000.

6. Digital rectal examination(DRE) grading

TABLE 11 – Crosstab for DRE grading

			AUR		
			0 –NO	1- YES	Total
DRE	0	Count	2	0	2
		% of Total	3.3%	.0%	3.3%
	1	Count	14	9	23
		% of Total	23.3%	15.0%	38.3%
	2	Count	12	18	30
		% of Total	20.0%	30.0%	50.0%
	3	Count	2	3	5
		% of Total	3.3%	5.0%	8.3%
	Total	Count	30	30	60
		% of Total	50.0%	50.0%	100.0%

Chi-Square Tests - 4.487 , p 0.213 NOT SIGNIFICANT.

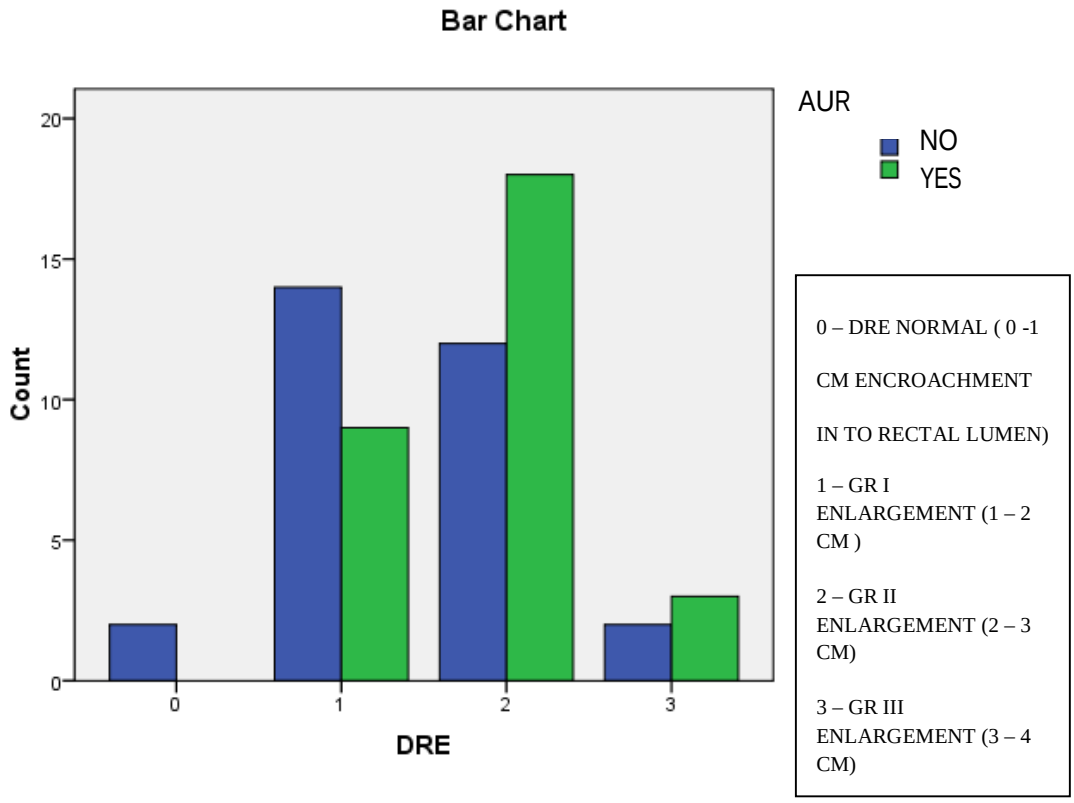


Figure 15 – DRE size grading distribution

Most of the patients in AUR group found to have GR II enlargement(2 -3 cm), and in non AUR group had GR I (1-2 cm) enlargement.

There was no statistical significance between the two groups in concern with DRE grading as shown by p 0.213.

6. SIZE-GRADE - USG STUDY

TABLE 12 – Crosstab for distribution of various size of prostate

			AUR		
			0-NO	**1 –YES**	**Total**
SIZE-GRADE	0	Count	0	1	1
		% of Total	.0%	1.7%	1.7%
	1	Count	17	8	25
		% of Total	28.3%	13.3%	41.7%
	2	Count	10	14	24
		% of Total	16.7%	23.3%	40.0%
	3	Count	2	4	6
		% of Total	3.3%	6.7%	10.0%
	4	Count	1	3	4
		% of Total	1.7%	5.0%	6.7%
	Total	Count	30	30	60
		% of Total	50.0%	50.0%	100.0%

Chi-Square Tests – 6.573, p 0.160 NOT SIGNIFICANT .

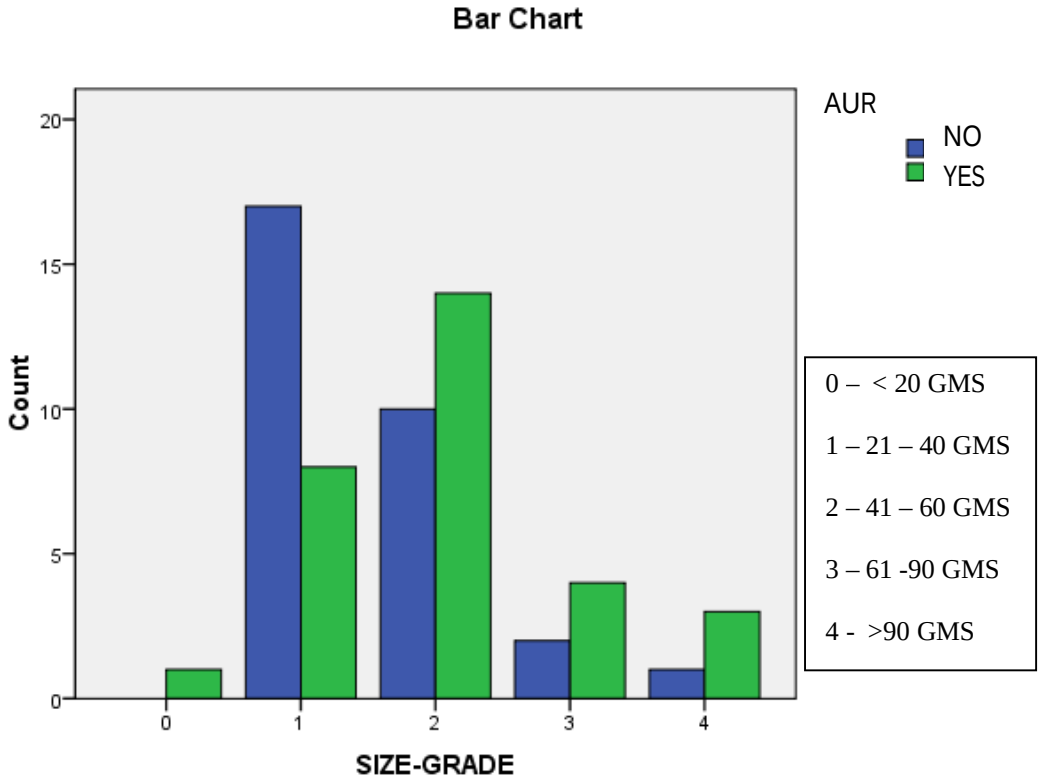


Figure – 16 – Prostatic size distribution by USG

Most of the patients in AUR group found to have GR II enlargement (41 – 60gms), and in non AUR group had GR I enlargement (21 - 40 gms)

T TEST - TABLE 13 - Group Statistics

AUR		N	Mean	Std. Deviation	Std. Error Mean
USG SIZE	1 – yes	30	50.97	21.744	3.970
	0 – no	30	35.43	16.032	2.927

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	T	df	Sig. (2-tailed)
SIZE	Equal variances assumed	1.812	.184	3.149	58	.003
	Equal variances not assumed			3.149	53.337	.003

T – 3.149 p 0.003 STATISTICALLY SIGNIFICANT.

Mean volume of the prostate gland was about 50.97gms in AUR group and in the non AUR group it was 35.43 with a statistical significance, p 0.003 .

7. BLADDER WALL THICKNESS- GRADE - USG STUDY

TABLE 14 – Crosstab for BWT grading

			AUR		
			0 -NO	**1 –YES**	**Total**
BWT GRADE	0-<5mm	Count	19	10	29
		% of Total	31.7%	16.7%	48.3%
	1->5mm	Count	11	20	31
		% of Total	18.3%	33.3%	51.7%
	Total	Count	30	30	60
		% of Total	50.0%	50.0%	100.0%

Chi-Square Tests – 5.406 , p 0.020 STATISTICALLY SIGNIFICANT.

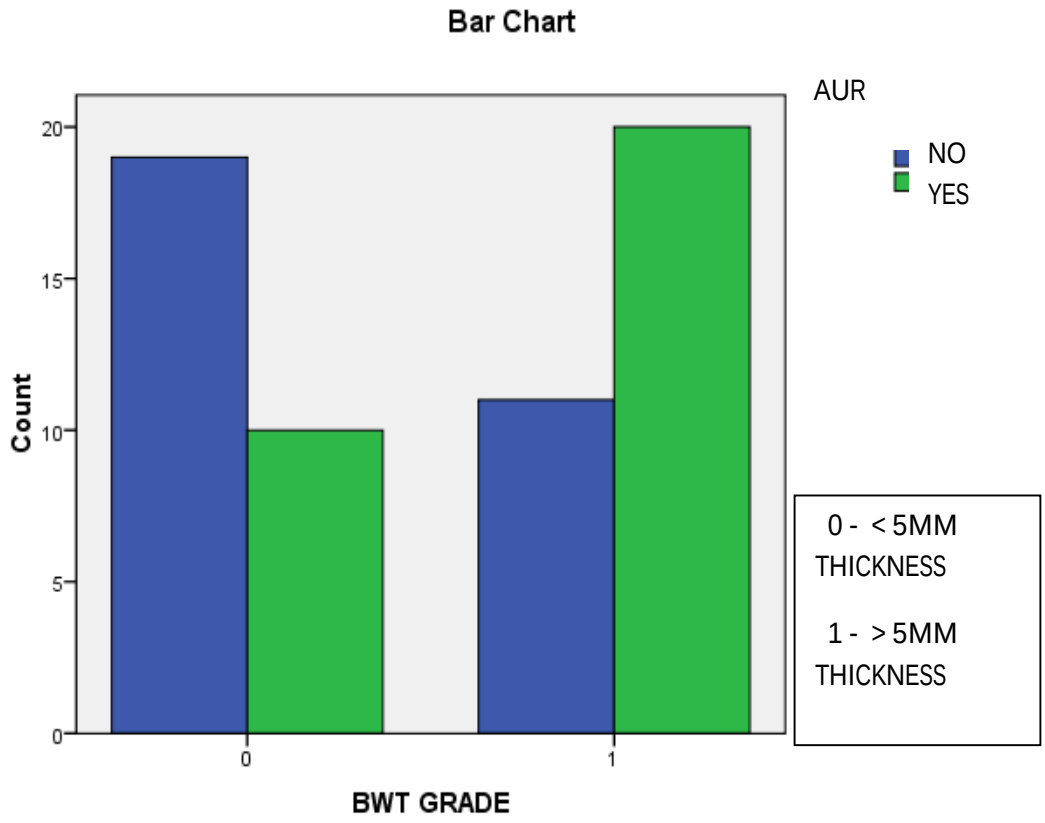


Figure 17 – BWT grading distribution

Most of the patients in AUR group had thickness of more than 5 mm, where as in the non AUR group it was less than 5mm with a statistical significance, p 0.020.

T TEST - Table 15 - Group Statistics

	AUR	N	Mean	Std. Deviation	Std. Error Mean
Bladder wall Thickness	1 – yes	30	6.13	1.074	.196
	0 – no	30	5.50	1.042	.190

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	T	df	Sig. (2-tailed)
BWT	Equal variances assumed	.155	.695	2.318	58	.024
	Equal variances not assumed			2.318	57.947	.024

T – 2.318 p 0.024 STATISTICALLY SIGNIFICANT .

Mean bladder wall thickness in AUR group was 6.13 mm and in non AUR group it was 5.5mm with statistical significance , p 0.024.

8. INTRAVESICAL PROSTATIC PROJECTION

Table 16 – Crosstab for IPP grading

			AUR		
			0–NO	**1-YES**	**Total**
IPP	0	Count	17	5	22
		% of Total	28.3%	8.3%	36.7%
	1	Count	7	10	17
		% of Total	11.7%	16.7%	28.3%
	2	Count	5	11	16
		% of Total	8.3%	18.3%	26.7%
	3	Count	1	4	5
		% of Total	1.7%	6.7%	8.3%
	Total	Count	30	30	60
		% of Total	50.0%	50.0%	100.0%

Chi-Square Tests–11.125 , p 0.011 STATISTICALLY SIGNIFICANT.

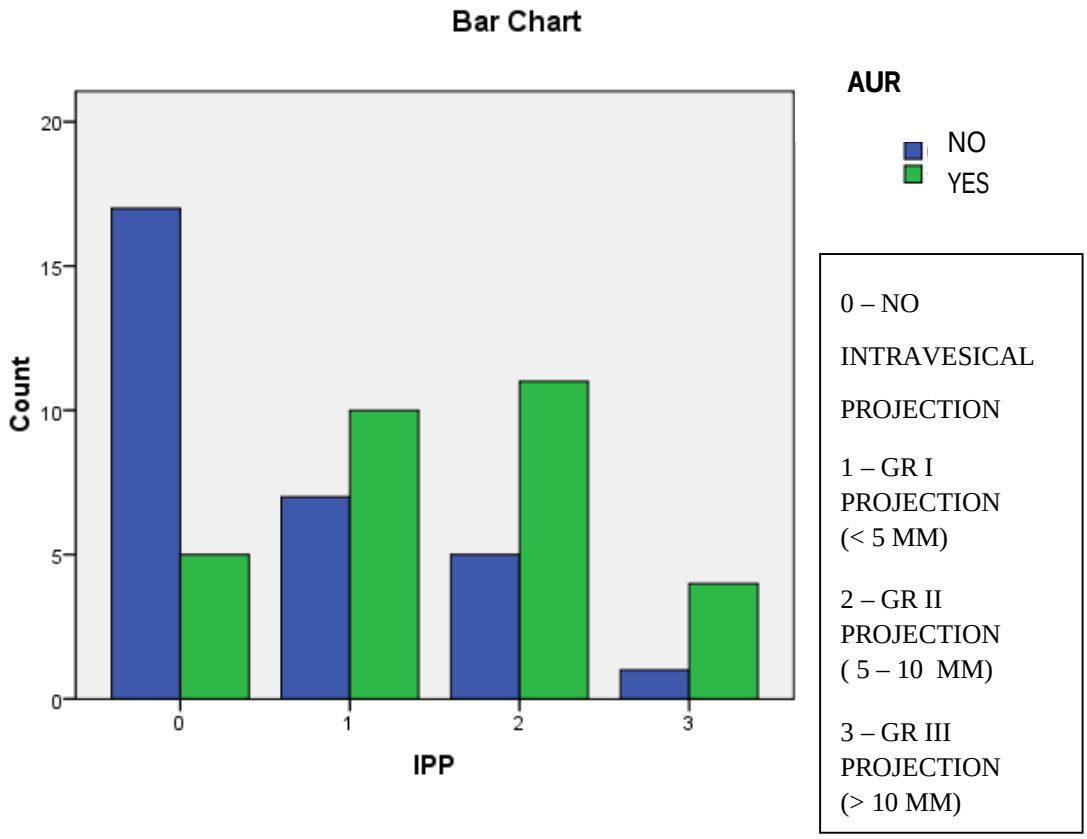


Figure 18- IPP grading distribution

Most of the patients in AUR group had GR II IPP (5 – 10 mm) where as, in the non AUR group it was GR 0 (no IPP) with a statistical significance, p 0.011.

9. SERUM PSA

Table 17 – Crosstab for sr PSA levels

			AUR		
			0- NO	**1-YES**	**Total**
PSA	0	Count	18	13	31
		% of Total	30.0%	21.7%	51.7%
	1	Count	12	13	25
		% of Total	20.0%	21.7%	41.7%
	2	Count	0	4	4
		% of Total	.0%	6.7%	6.7%
	Total	Count	30	30	60
		% of Total	50.0%	50.0%	100.0%

Chi-Square Tests – 4.846, p 0.089 NOT SIGNIFICANT.

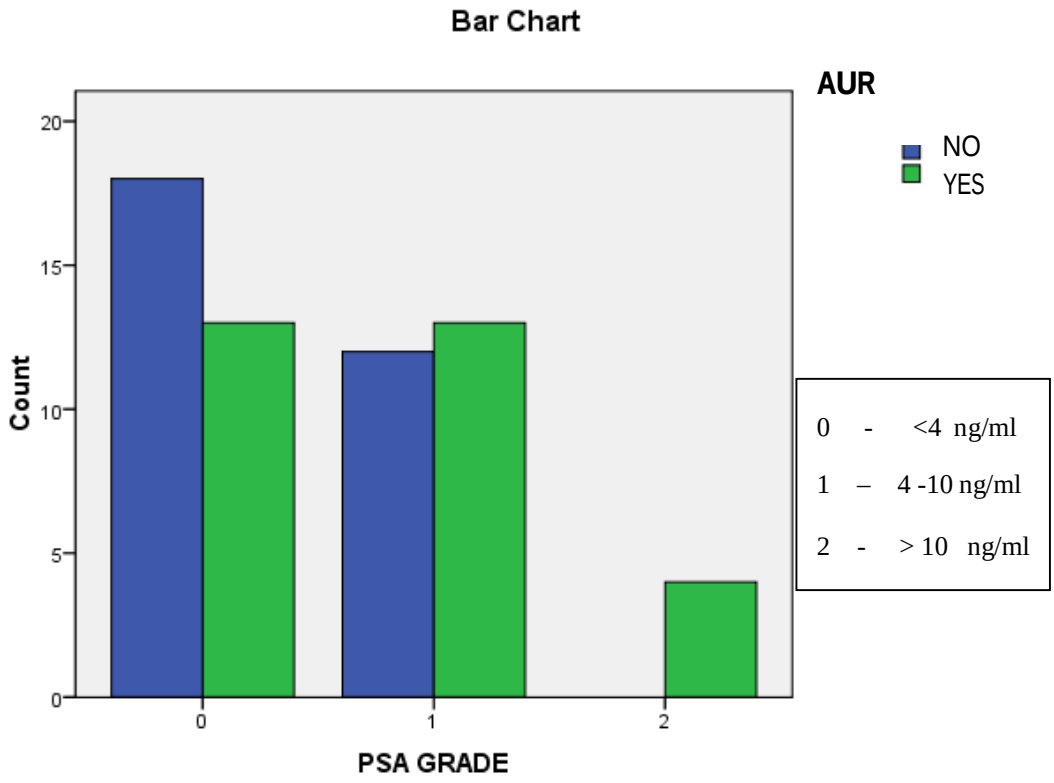


Figure 19 –Distribution of various PSA levels

Most of the patients in non AUR group had PSA < 4 ng/ml where as , in the AUR group there were equal number of patients with < 4ng/ml and 4 – 10 ng /ml.

T- test

Table 18 - Group Statistics

	AUR	N	Mean	Std. Deviation	Std. Error Mean
PSA	1 –yes	30	6.016000	5.5069822	1.0054328
	0 – no	30	3.593333	1.8600952	.3396054

Independent sample test

		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	**Sig.**	**T**	**df**	**Sig. (2-tailed)**
PSA	Equal variances assumed	8.139	.006	2.283	58	.026
	Equal variances not assumed			2.283	35.532	.029

T – 2.283 p 0.026 STATISTICALLY SIGNIFICANT.

Mean PSA level in the AUR group was about 6.02ng/ml and in the non AUR group it was 3.59ng /ml with a statistical significance , p 0.026.

10.URINE CULTURE - Table 19 – Crosstab for UTI association

			AUR		
			0 –NO	**1 – YES**	**Total**
URINE CULTURE	0	Count	18	15	33
		% of Total	30.0%	25.0%	55.0%
	1	Count	5	8	13
		% of Total	8.3%	13.3%	21.7%
	2	Count	3	2	5
		% of Total	5.0%	3.3%	8.3%
	3	Count	1	0	1
		% of Total	1.7%	.0%	1.7%
	4	Count	3	5	8
		% of Total	5.0%	8.3%	13.3%
	Total	Count	30	30	60
		% of Total	50.0%	50.0%	100.0%

Chi-Square Tests - 2.665, p 0.615 NOT SIGNIFICANT.

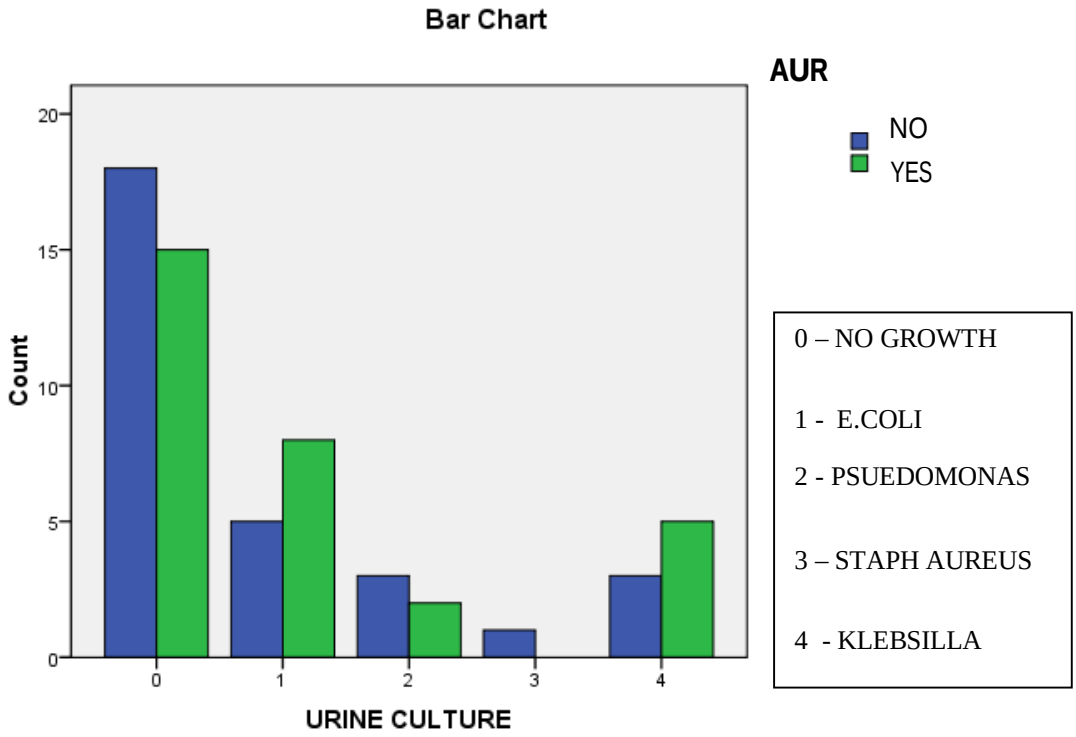


Figure 20 – Distribution of urine culture reports

Most of the patients in both the groups showed no organisms grown in urine culture .

There was no statistical significance between the two groups in concern with urine culture positivity with a p 0.615.

DISCUSSION

In men older than 50 years, benign prostatic hyperplasia (BPH) is a common disease. The incidence of BPH in this age group is about 19-30% [43].Deterioration of bladder detrusor function, urinary tract infection, obstruction induced renal failure and also acute urinary retention (AUR) are all long-term consequences of the BPH[44].

The impact that acute urinary retention can have on the quality of life is comparable to that of an of attack of renal colic.[1] Even a single episode of urinary retention is significant for a patient with BPH. It is characterized by the inability to void , increasing pain, and need for catheterization .Follow-up visits to the doctor is required with an attempt of trial voiding. If trial voiding fails , the patient may require surgery. The entire process is painful and time-consuming . The risk of recurrent retention was 56%–64% within 1 week of the first episode as per the previously available data .[2–4]

The risk of acute urinary retention is higher in a patient with BPH when compared to the general population. Several strong risk factors for AUR have been identified by analytical studies. The most important risk factor is serum prostate-specific antigen (PSA). The other risk factors are prostate volume, maximum flow rate, and symptom severity.

These should be kept in mind when counseling patients with benign prostatic hyperplasia who are planned for medical management.

There has been a remarkable change in the approach and management of patients with AUR. Several factors that can result in AUR or associated with AUR have been identified. AUR may be classified as that related to BPH or not related to BPH. It can be either spontaneous or precipitated. The management involves urgent bladder decompression . This can be achieved by either urethral catheterization or suprapubic catheterization. All patients should undergo an attempt of trial without catheter. However a significant number of patients may not void. These patients require surgery usually within the first year of follow-up.

One of the prophylactic measures attempted to prevent AUR in men with moderate to severe LUTS and large sized prostate, is the use of 5 alpha reductase inhibitors. Alpha blockers have also been used in symptomatic BPH patients to prevent AUR. Its use can aid in voiding following catheter removal. Anticholinergic drugs can be used in combination with alpha blockers in patient with BPH. This combination does not increase the risk of AUR. The time to surgery after AUR can be delayed with the use of alpha blockers and in patients who is responding well, surgery can even be avoided. However conclusive

evidence to prove reduction of risk of AUR with the use of finasteride and α-blockers is still lacking.

In the past, an episode of AUR was an absolute indication for surgery. Between twenty five to thirty percent of men who underwent transurethral resection of the prostate (TURP) in the past had AUR as their main indication for surgery.[5] At present only those patients who fails trial without catheter undergo surgery.

TURP is the treatment of choice if a patient fails trial without catheter. It is the "gold standard". Other minimally invasive procedures can be considered in poor-risk patients. The safety and efficacy of these procedures, however, is yet to be determined.

In contrast to patients presenting with symptoms only ,TURP has been found to be associated with increased morbidity and mortality in men with AUR . Delayed TURP is associated with lower morbidity and mortality than urgent intervention in a patient who had an episode of AUR. Hence , it is justifiable to attempt primary prevention of AUR especially in those patients with increased risk such as older patients, patients with severe symptoms, larger sized glands, and increased PSA levels.

We planned to determine the factors that can predict which patients can go in for urinary retention by comparing patients who had AUR - with patients presented only with LUTS (non AUR). Those patients who are at increased risk can be offered earlier treatment options, either medical management (α - blockers or 5 α reductase inhibitors) or surgery (TURP).

We compared the following factors between AUR and non AUR groups.

1.Age, 2.comorbid illnesses, 3.previous history of urinary retention,4.IPSS symptom severity and grading ,5.prostate size grading as per digital rectal examination (DRE),Ultrasound evaluation- 6.size of prostate, 7.thickness of bladder wall, 8.intravesical protrusion grading, 9. serum PSA level and 10.presence of urinary tract infection.

In our study among the 63 patients,2 patients in AUR group (one having treatment with antidepressants, one with neurogenic bladder dysfunction)and one in non AUR group (biopsy confirmed Carcinoma prostate) were excluded. Both groups were analysed for statistical equality.

1. AGE

Age group: Both groups were matched for appropriate age. The mean age for AUR group was 64.23 years and non AUR group 64.83. Age distribution: Most of the patients in both groups belong to 51 – 60 years age group . there was no statistical significance between the various age groups between AUR and non AUR group as shown by p 0.79.This is in correlation with the observational study done by Kurita et al (1998)[17] ,which showed no significant differences between the two groups in concern with age. In contradiction to the above results , various studies such as Olmsted county study ,(Jacebson et al -1997) [6],the physician health study (Meigs et al -1999)[13] and Berges et al(2000)[16] – all showed that advanced age was an important risk factor for AUR.

2.COMORBID ILLNESSES

There was no statistical significance in concern with presence of any of the comorbid illness like diabetes mellitus, systemic hypertension , ischemic heart disease, COPD, pulmonary tuberculosis between the AUR/non AUR groups. Eventhough Sasaki et al (2003), [45] proposed presence of diabetes mellitus as one of the risk factor for AUR in BPH patients, our study was not correlating with that .

3.PREVIOUS HISTORY OF AUR:

There exists a statistical significance between AUR and non AUR groups with respect to past history of urinary retention with a p 0.010. Our study was correlated with experience of Breum et al (1982)[2]. As per this study ,in men with BPH, who had one episode of AUR - risk of second episode of AUR was about 70-80% .

A study involving large database of 165,527 men with BPH , with AUR conducted by Cathcart et al.(2006)[46].According to this study, increase in recurrent AUR was seen in patients who have not underwent surgical intervention following AUR.

Although the likelihood of a second event of acute urinay retention after a Trial voiding without catheter (TWOC) was about 38-56%. The risk of recurrent retention depends on prostate size ,amount of post void residual urinary volume (PVR), and also the duration between catheterisation and the TWOC.[47]Klarskov et al.(1987) showed that after a single episode of acute urinary retention 85% of men required surgical intervention within a follow up of one year,. [48]A study involving 5,792 BPH men. who were offered conservative management with drugs . This study done by Emberton M et al showed that prior episode of acute urinary retention was a strong predictor of recurrent

episodes of acute urinary retention.[49.] All of the above were correlating well with our study.

4. IPSS-SEVERITY AND GRADING

Most of the patients in both groups presented with moderate IPSS score(8 -19)

Mean IPSS score for AUR group was 20.6 and for non AUR group was 15.3 with a statistical significance , p 0.000.This is very well correlating with various studies such as Olmsted county study, (Jacebson et al -1997) [6],the physician health study (Meigs et al -1999)[13], and Berges et al(2000)[16] all showed that IPSS symptom severity is an important risk factor that predicts AUR.

Also Marberger MJ et al (2000)[19]and the PLESS Study Group, Roehrborn CG et al (2000)[21] , McConnell JD, (1998)[14], Kaplan S(2000)[20]showed that IPSS symptom severity was an important predictor of AUR.

However, observational study done by Kurita et al (1998)[17], which showed no significant differences noted among the two groups in terms of symptom severity, contradicting the above results.

5.DIGITAL RECTAL EXAMINATION - SIZE GRADING

DRE grading was done using length of vertical prominence or encroachment in to the rectal lumen. Most of the patients in AUR group found to have GR II (2 – 3 cm) enlargement , and in non AUR group had GR I enlargement (1- 2cm).There was no statistical significance observed among the two groups in concern with size grading of the prostate by DRE as shown by p 0.213. Since no universally accepted nomenclature describing prostatic size by DRE is available , and there are no validated studies available for comparing the above result.

6. SIZE OF PROSTATE – USG STUDY

Most of the patients in non AUR group found to have GR I enlargement(21 – 40 gms) and in AUR group had GR II enlargement(41 -60 gms). Mean volume of the prostate gland was about 50.97gms in AUR group and in the non AUR group it was 35.43 with a statistical significance, p 0.003 this is very well correlating with Olmsted county study, (Jacebson et al -1997)[6], showed that increase in size of the prostate is an important risk factor that predicts AUR.

This was also confirmed by Marberger MJ et al (2000)[19] and the PLESS Study Group, Roehrborn CG et al (2000)[21] , McConnell JD,

(1998)[14], Kaplan S(2000)[20] showed that prostate volume was an important predictor for AUR.

Saboorian and colleagues ,conducted a study and compared the amount of tissue resected in men with AUR and non AUR group.90 men in AUR group and 87 men of non AUR were compared . He observed a significant difference between the two groups .(30.1 ± 28.8 SD vs 21.8 ± 25.6 SD cc; P < .01).[18]

7. BLADDER WALL THICKNESS(BWT) - USG STUDY

Most of the patients in AUR group had thickness of more than 5 mm, where as in the non AUR group it was less than 5mm with a statistical signifance , p 0.020.

Mean bladder wall thickness in AUR group was 6.13 mm and in non AUR group it was 5.5mm with statistical significance , p- 0.024 .This confirms the experience of Manieri*et al.(*1996)[50] who reported BWT of> 5 mm was the good cut-off point to diagnose bladder outlet obstruction.88% of men with bladder wall thickness >5 mm were found to be obstructed and only about 63% of men with bladder wall thickness <5mm were found to have no obstruction. Kessler *et al.* (2006)[51] showed that BWT ≥2.9 mm and Oelke *et al.*

(2007) chose a cut-off of 2 mm as a guide for diagnosing bladder outlet obstruction.[52]

Contrary to above evidence, Abhishek Jain et al (2010) did not observe any statistically significant difference between patients with AUR and without AUR in terms of bladder wall thickness. This may be attributed due to difference heterogeneous patients group and also variations in the patient duration of symptoms were not studied.[53]

8. INTRA VESICAL PROTRUSION OF PROSTATE(IPP)-USG STUDY

Most of the patients in AUR group had GR II IPP (5 – 10 mm) where as , in the non AUR group it was GR 0 (no IPP) with a statistical signifance , p 0.010.

In the early 1990s, while doing transabdominal USG study for patients with lower urinary tract symptom (LUTS) suggestive of BPH for transurethral microwave thermal therapy, it was noticed that there was good correlation between the degree of protrusion of the prostate into the bladder cavity and the severity of obstruction as measured by a properly conducted uroflowmetry. Patients with minimal protrusion and a funneling bladder neck had good flow rates, whereas those with large intravesical protrusion had poor flow rates.

In a study conducted by Chia et al. (2003) [42] demonstrated that patients with grade 1 IPP were not obstructed, while 94% of grade 3 IPP were obstructed. The positive predictive value was 94%, while the negative predictive value was 79%.14 A similar study in Brazil showed that the receiveroperating characteristic (ROC) for IPP and bladder outlet obstruction (BOO) was 0.758 (95% confidence interval: 0.601-0.876) and the cutoff point to indicate BOO was 5 mm with 95% sensitivity and 50% specificity.[54]

In a study conducted by Tan and Foo et al(2003) - [55] of 100 patients with acute urinary retention (AUR) who underwent trial off catheter, a grade 3 IPP was found to predict 67% failure rate. In contrast, 64% of patients with grade 1 IPP were successful. With a follow-up of 6 months, four patients who were initially trialed off successfully developed AUR again. Of these patients, three had grade 3 IPP, whereas one has grade 2, suggesting that a high-grade IPP was also predictive of recurrent AUR.[56]

In a similar study, Zhang et al.(2006) with 115 patients on a trial off catheter in Jinan, China, showed concordant results with a failure rate of 31% for grade 1 IPP and 69% for grade 3 IPP.[57]

9.SERUM PSA

Most of the patients in non AUR group had PSA < 4 ng/ml whereas , in the AUR group there were equal number of patients with < 4ng/ml and 4 – 10 ng /ml. Mean PSA level in the AUR group was about 6.01ng/ml and in the non AUR group it was 3.59ng /ml with a statistical signifance, p 0.026.

This was also confirmed by Marberger MJ et al (2000) [19] and the PLESS Study Group, Roehrborn CG et al (2000)[21], McConnell JD, (1998)[14], Kaplan S(2000)[20] showed that increased serum PSA levels was an important predictor for AUR.

Saboorian and colleagues (1993)[18] showed that serum prostate-specific antigen (PSA) done prior to surgery were also significantly different between AUR and non AUR groups (6.5 ± 5.5 SD vs 4.5 ± 4.6 SD; P < .001),correlating well with our study.

10. URINE CULTURE AND SENSITIVITY

Most of the patients in both the groups showed no organisms grown in urine culture.

Contrary to studies, John M Fitzpatrick et al (2012)[59] ,Muruganandham et al (2007) [58], Herbert Lepor et al (2006)[60]

considered ,urinary tract infection (UTI) as a risk factor for AUR, our study did not found any statistically significant difference between the AUR and non AUR groups in concern with urine culture positivity with a p 0.615.

CONCLUSION

Symptom severity, previous AUR episodes, high serum PSA levels, increased size of prostate ,increased bladder wall thickness, increased intravesical prostatic projection are accurate predictors of acute urinary retention in patients with Benign Prostatic Hyperplasia. Those patients who are at risk can be offered earlier treatment options ,could be either medical or surgical intervention to prevent AUR.

BIBLIOGRAPHY

1. Thomas K, Oades G, Taylor-Hay C, Kirby RS. Acute urinary retention: What is the impact on patients' quality of life? BJU Int 2005;95:72-6.

2. Breum L, Klarskov P, Munck LK, et al. Significance of acute urinary retention due to infravesical obstruction. Scand J UrolNephrol. 1982;16:21–24.

3. Hastie KJ, Dickinson AJ, Ahmad R, Moisey CU. Acute retention of urine: is trial without catheter justified? J R CollSurgEdinb. 1990;35:225–227.

4. Klarskov P, Andersen JT, Asmussen CF, et al. Symptoms and signs predictive of the voiding pattern after acute urinary retention in men. Scand J UrolNephrol. 1987;21:23–28.

5. Holtgrewe HL, Mebust WK, Dowd JB, et al. Transurethral prostatectomies: practical aspects of the dominant operation in American urology. J Urol. 1989;141:248–253.

6. Jacobsen SJ, Jacobson DJ, Girman CJ, et al. Natural history of prostatism: risk factors for acute urinary retention. J Urol. 1997;158:481–487.

7. Birkhoff JD, Wiederhorn AR, Hamilton ML, Zinsser HH. Natural history of benign prostatic hypertrophy and acute urinary retention.Urology. 1976;7:48–52.

8. Ball AJ, Feneley RC, Abrams PH. The natural history of untreated “prostatism.” Br J Urol. 1981;53:613–616.

9. Craigen AA, Hickling JB, Saunders CR, Carpenter RG. Natural history of prostatic obstruction. J R Coll Gen Pract. 1969;18: 226–232.

10. Hunter DJ, Berra-Unamuno A, Martin-Gordo A. Prevalence of urinary symptoms and other urological conditions in Spanish men 50 years old or older. J Urol. 1996;155:1965–1970. See comments.

11. Wasson JH, Reda DJ, Bruskewitz RC, et al. A comparison of transurethral surgery with watchful waiting for moderate symptoms of benign prostatic hyperplasia. The Veterans Affairs Cooperative Study Group on Transurethral Resection of the Prostate. N Engl J Med. 1995;332:75–79.

12. Barry MJ, Fowler FJ, Bin L, et al. The natural history of patients with benign prostatic hyperplasia as diagnosed by North American urologists. J Urol. 1997;157:10–15.

13. Meigs JB, Barry MJ, Giovannucci E, et al. Incidence rates and risk factors for acute urinary retention: the health professionals follow-up study. J Urol. 1999;162:376–382.

14. McConnell JD, Bruskewitz R, Walsh P, et al. The effect of finasteride on the risk of acute urinary retention and the need for surgical treatment among men with benign prostatic hyperplasia. Finasteride Long-Term Efficacy and Safety Study Group. N Engl J Med. 1998;338:557–563. [PubMed]

15. Andersen JT, Nickel JC, Marshall VR, et al. Finasteride significantly reduces acute urinary retention and need for surgery in patients with symptomatic benign prostatic hyperplasia. Urology. 1997;49:839–845.

16. Berges R, Pientka L, Hofner K, et al. Herner LUTS Study: incidence of acute urinary retention in the elderly men in Germany. J Urol. 2000;163(4 suppl):252.

17. Kurita Y, Masuda H, Terada H, et al. Transition zone index as a risk factor for acute urinary retention in benign prostatic hyperplasia. Urology. 1998;51:595–600.

18. Saboorian M, Gurevitch E, Salinger F, et al. Morphometric analysis of pathological specimens in men undergoing prostate surgery for acute retention or symptoms of BPH only. J Urol. 1998;159:108.

19. Marberger MJ, Andersen JT, Nickel JC, et al. Prostate volume and serum prostate-specific antigen as predictors of acute urinary retention. Combined experience from three large multinational placebo-controlled trials. Eur Urol. 2000;38:563–568.

20. Kaplan S, Garvin D, Gilhooly P, et al. Impact of baseline symptom severity on future risk of benign prostatic hyperplasia-related outcomes and long-term response to finasteride. The PLESS Study Group. Urology. 2000;56:610–616.

21. Roehrborn CG, Bruskewitz R, Nickel GC, et al. Urinary retention in patients with BPH treated with finasteride or placebo over 4 years. Characterization of patients and ultimate outcomes. The PLESS Study Group. Eur Urol. 2000;37:528–536.

22. Roehrborn C, Malice M-P, Cook T, Girman C. Clinical predictors of spontaneous acute urinary retention in men with LUTS and clinical BPH: a comprehensive analysis of the pooled placebo groups of several large clinical trials. Urology. 2001;58:210–216.

23. Kefi A, Koseoglu H, Celebi I, Yorukoglu K, Esen A. Relation between acute urinary retention, chronic prostatic inflammation and accompanying elevated prostate-specific antigen. Scand J UrolNephrol 2006;40:155-60.

24. Roehrborn CG; The MTOPS research group. The impact of acute or chronic in ammation in baseline biopsy on the risk of progression in the MTOPS study. EurUrolSuppl 2005;4:5.

25. Kramer G, Mitteregger D, Marberger M. Is benign prostatic hyperplasia (BPH) an immune inflammatory disease? EurUrol 2007;51:1202-16.

26. Graversen PH, Gasser TC, Wasson JH, et al. Controversies about indications for transurethral resection of the prostate [review] J Urol. 1989;141:475–481.

27. Spiro LH, Labay G, Orkin LA. Prostatic infarction. Role in acute urinary retention. Urology. 1974;3:345–347.

28. Abeshouse BS. Infarct of the prostate. J Urol 1933;30:97.

29. Anjum I, Ahmed M, Azzopardi A, Mufti GR. Prostatic infarction/infection in acute urinary retention secondary to benign prostatic hyperplasia. J Urol. 1998;160(3 pt 1):792–793..

30. acobsen SJ, Jacobson DJ, Girman CJ, et al. Natural history of prostatism: risk factors for acute urinary retention. J Urol. 1997;158:481–487

31. Terris MK. Ultrasonography and biopsy of the prostate. In : Walsh PC, Retik 1AB, Vaughan ED, Wein AJ, editors. Campbell's urology. 5 th ed. WB Saunders Co: Philadelphia; 2003. p. 3038-54.

32. Keita H, Diouf E, Tubach F, Brouwer T, Dahmani S, Mantz J, et al. Predictive factors of early postoperative urinary retention in the post anaesthesia care unit. AnesthAnalg 2005;101:592-6.

33. Athanasoupolos A, Gyftopoulos K, Giannitsas J, Fiss J, Perimenis P, Barbalias G. Combination treatment with an alpha-blocker plus an anticholinergic for bladder outlet obstruction: A prospective, randomized, controlled study. J Urol 2003;169:2253-6.

34. Reynard JM. Does anticholinergic medications have a role for men with lower urinary tract symptoms/benign prostatic hyperplasia either alone or in combination with other agents. CurrOpinUrol 2004;14:13-6.

35. Barclay L. NSAIDs may double the risk of acute urinary retention in men. Arch Intern Med 2005;165:1547-51.

36. Powell PH, Smith PJ, Feneley RC. The identification of patients at risk from acute retention. Br J Urol. 1980;52:520–522.

37. Stimson JB, Fihn SD. Benign prostatic hyperplasia and its treatment [review] J Gen Intern Med. 1990;5:153–165.

38. Roehrborn CG, McConnell JD, Lieber M, et al. Serum prostate-specific antigen concentration is a powerful predictor of acute urinary retention and need for surgery in men with clinical benign prostatic hyperplasia. PLESS Study Group. Urology. 1999;53:473–480.

39. McNeil SA. Spontaneous versus precipitated AUR: The same? World J Urol 2006;24:354-9.

40. Emberton M. Definition of at-risk patients: Dynamic variables. BJU Int 2006;97:12-5.

41. ManickamRamalingam, David albala Textbook on benign prostatic hyper plasia 2012 ,1 , 20 -21

42. Chia SJ, Heng CT, Chan SP, Foo KT. Correlation of intravesical prostatic protrusion with bladder outlet obstruction. *BJU Int 2003;91:371-374.*

43. Bosch JL, Hop WGJ, Kirkles WJ et al. Natural history of benign prostatic hyperplasia: appropriate case definition and estimation of its prevalence in the community. Urology 1995;46: 34-40.

44. Guess HA: Benign prostatic hyperplasia: antecedents and natural history. Epidemiol Rev1992; 14: 131–153.

45. Sasaki K, Yoshimura N, Chancellor MB. Implications of diabetes mellitus in urology. *UrolClin North Am*. 2003;30(1):1-12.

46. Cathcart P, van der Meulen J, Armitage J, Emberton M. Incidence of primary and recurrent acute urinary retention between 1998 and 2003 in England. J Urol 2006;176:200-4.

47. Kumar V, Marr C, Bhuvangiri A, Irwin P. A prospective study of conservatively managed acute urinary retention: Prostate size matters. BJU Int 2000;86:816-9.

48. Klarskov P, Andersen JT, Asmussen CF, Brenoe J, Kromman Jensen S, Jensen IL, et al . Symptoms and signs predictive of the voiding pattern after acute urinary retention in men.Scand J UrolNephrol 1987;21:23-8.

49. Emberton M, Lukacs B, Matzkin H, Alcaraz A, Elhilali M, Vallancien G. Response to daily 10 mg alfuzosin predicts acute urinary retention and benign prostatic hyperplasia related surgery in men with lower urinary tract symptoms. J Urol 2006;176: 1051-6.

50. Manieri C, Carter SS, Romano G, Trucchi A, Valenti M, Tubaro A. The diagnosis of bladder outlet obstruction in men by ultrasound measurement of bladder wall thickness. J Urol 1998;159:761.

51. Kessler TM, Gerber R Burkhard FC, Studer UE, Danuser H. Ultrasound assessment of detrusor thickness in men: Can it predict bladder outlet obstruction and replace pressure flow study? J Urol 2006;175:2170-3.

52. Oelke M, Hofne k, Jonas U, de la Rosette J, Ubbink D, Wijkstra H. Diagnostic accuracy of non invasive tests to evaluate bladder outlet obstruction in men: Detrusor wall thickness, Uroflowmetry, post void residual urine and prostate volume. EurUrol 2007;52:827-34

53. Abhishek Jain, SN Sankhwar, ApulGoel . Bladder wall thickness for the assessment of voiding dysfunction ,IJU .2010 ;26;319-320 -2

54. Reis LO, Barreiro GC, Baracat J, *et aI*. Intravesical prostatic of the prostate as a predictive method of bladder outlet obstruction. IntBraz J UroI2008;34(S):627-7.

55. Tan YH, Foo KT.lntravesical prostatic protrusion predicts the outcome of a trial without catheter following acute urine retention. *J UroI2003;170:2339-2341.*

56. Rhodes T, Girman q, Jacobson DJ, *et al.* Longitudinal prostate volume in a community based sample: 7-year follow-up in the Olmsted County study of urinary symptoms and health status among men. *J UroI2000;163:248[A1105].*

57. Zhang KQ Shi BK, Wang HX, *et al.* Correlation of intravesical prostatic protrusion with the outcome of voiding trial following acute urine retention. *J ClinUrol 2006;21(7):* 484-486 .

58. K Muruganandham, Deepak Dubey, Rakesh Kapoor. Acute urinary retention in benign prostatic hyperplasia: Risk factors and current management, IJU ;2007;23;347 -353.

59. John M Fitzpatrick, François Desgrandchamps, KamelAdjali, Lauro Gomez Guerra, Sung Joon Hong, Salman El Khalid, and KrisadaRatana-Olarn- Management of acute urinary retention: benign prostatic hyperplasia-BJU;2012;109(1);88-95.

60. Herbert Lepor, MD-Managing and Preventing Acute Urinary Retention; Rev Urol. 2005; 7(Suppl 8): S26–S33.

ABBREVIATIONS

AUR – ACUTE URINARY RETENTION

BPH- BENIGN PROSTATIC HYPERPLASIA

BOO- BLADDER OUTLET OBSTRUCTION

DRE- DIGITAL RECTAL EXAMINATION

TURP- TRANS URETHRAL RESECTION OF PROSTATE

LUTS- LOWER URINARY TRACT SYMPTOMS

MTOPS- MEDICAL THERAPY OF PROSTATIC SYMPTOMS

TRUS- TRANS RECTAL ULTRASOUND

TWOC – TRIAL WITH OUT CATHETER

BWT- BLADDER WALL THICKNESS

IPP – INTRAVESICAL PROSTATIC PROTRUSION

ALFAUR- ALFUZOSIN IN ACUTE URINARY RETENTION

IR – INTERMEDIATE RELEASING

PVR – POST VOID RESIDUAL URINE

NSAIDS- NON STEROIDAL ANTI INFLAMMATORY DRUGS

PGE2- PROSTAGLANDIN E -2

UTI- URINARY TRACT INFECTION

IPSS- INTERNATIONAL PROSTATE SYMPTOM SCORING

PSA- PROSTATE SPECIFIC ANTIGEN

PLESS- PROSCAR LONG TERM EFFICACY SAFETY AND STUDY

SHT – SYSTEMIC HYPERTENSION

DM – DIABETES MELLITUS

IHD - ISCHEMIC HEART DISEASE

PT – PULMONARY TUBERCULOSIS

COPD – CHRONIC OBSTRUCTIVE PULMONARY DISEASE

PROFORMA

NAME:

AGE:

HOSPITAL NUMBER:

DATE OF ADMISSION:

PRESENT ILLNESS:

- Incomplete emptying:
- Frequency <2hours:
- Weak stream:
- Straining to void
- Hesitancy
- Intermittency
- Urgency
- Dysuria
- Nocturia
- Bowel habits, constipation:
- Precipitating factor: anesthesia, non prostate related surgery, drugs.

PAST HISTORY:

- Previous history of AUR:
- Type II diabetes mellitus, Parkinsons disease, stroke, spinal degenerative disease and disc prolapse

CLINICAL EXAMINATION:

- General examination:
- Abdominal examination :
- Digital rectal examination:

INVESTIGATIONS:

- Urine routine-
- Urine culture and sensitivity-
- Renal parameters-
- Sr. PSA-
- USG abdomen and pelvis-

-prostate volume

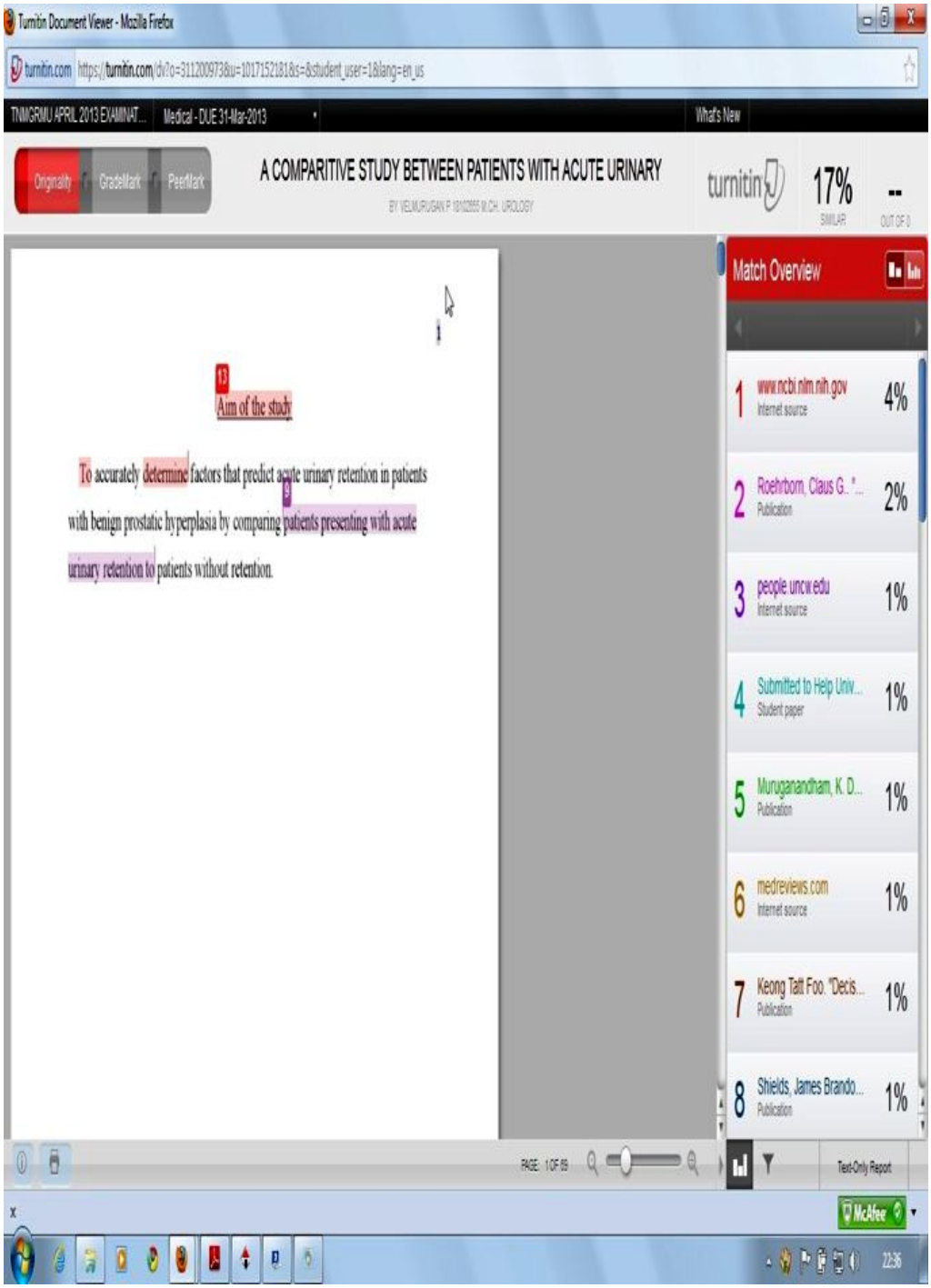
-bladder wall thickness (BWT)

-presence of intravesicalprostatic projection (IPP)

-amount of post void residual urine (PVR)volume

- Uroflowmetry-
- Cystoscopy -

FOLLOW UP:


Turnitin Document Viewer - Mozilla Firefox
turnitin.com https://turnitin.com/dv?o=311200973&u=1017152181&s=&student_user=1&lang=en_us
TNMGRMU APRIL 2013 EXAMINAT...
Medical - DUE 31-Mar-2013
What's New
Originality
GradeMark
PeerMark
A COMPARITIVE STUDY BETWEEN PATIENTS WITH ACUTE URINARY
BY VELMURUGAN P 10102055 M.CH. UROLOGY
turnitin
17%
SIMILAR
--
OUT OF 0
13
Aim of the study
To accurately determine factors that predict acute urinary retention in patients with benign prostatic hyperplasia by comparing patients presenting with acute urinary retention to patients without retention.
Match Overview
1 www.ncbi.nlm.nih.gov Internet source 4%
2 Roehrborn, Claus G.. "... Publication 2%
3 people.uncw.edu Internet source 1%
4 Submitted to Help Univ... Student paper 1%
5 Murugananandham, K. D... Publication 1%
6 medreviews.com Internet source 1%
7 Keong Taft Foo. "Decis... Publication 1%
8 Shields, James Brando... Publication 1%
PAGE: 1 OF 69
Text-Only Report
McAfee
22:36

INSTITUTIONAL ETHICAL COMMITTEE
GOVT.KILPAUK MEDICAL COLLEGE,
CHENNAI-10
Ref.N.1463/MEI(Ethics)/2012 Dt:03.04.2012

CERTIFICATE OF APPROVAL

The Institutional Ethical Committee of Govt. Kilpauk Medical College , Chennai reviewed and discussed the application for approval entitled "Study to determine factors that predict acute urinary retention in patients with Benign Prostatic Hyperplasia by comparing patients presenting with acute urinary retention to patients without retention" submitted by Dr.P.Velmurugan, Moh(Genitourinary Sur) PG Student, Govt. Kilpauk Medical College, Chennai-10.

The Proposal is APPROVED.

The Institutional Ethical Committee expects to be informed about the progress of the study any Adverse Drug Reaction Occurring in the Course of the study any change in the protocol and patient information /informed consent and asks to be provided a copy of the final report.

GOVT. KILPAUK MEDICAL COLLEGE
15 JUN 2012
Kilpauk, Chennai-10.

15/6/12
CHAIRMAN
Ethical Committee
Govt.Kilpauk Medical College,Chennai

15/6

MASTER CHART

NO.	NAME	AGE	AGE GROUP	INSTITUTE	IP NO.	DM	SHT	IHD	COPD/PT	COMORBID ILLNESS	PAST AUR	IPSS	IPSS GRADE	DRE	SIZE	SIZE GRADE	BWT	BWT GRADE	IPP GRADE	PSA	PSA GRADE	CULTURE	ORGANISMS	AUR
1	CHINNASWAMY	67	2	GRH	986034	0	0	0	0	0	0	11	2	1	34	1	5	0	0	1.8	0	0	NIL	NO
2	JOSEPH	75	3	GRH	986558	1	1	0	0	1	0	15	2	2	40	1	5	0	0	4.1	1	0	NIL	NO
3	KANNAN	65	2	GRH	987251	0	1	0	0	2	0	12	2	2	42	2	6	1	1	1.9	0	1	E.COLI	NO
4	SUBRAMNI	50	0	GRH	987719	0	0	0	0	0	0	15	2	1	22	1	5	0	0	0.9	0	2	PSEUDOMONAS	NO
5	VEERASAMY	60	1	GRH	988107	0	0	0	0	0	0	16	2	3	44	2	8	1	2	6.2	1	0	NIL	NO
6	SALIYA	74	3	GRH	988927	1	0	0	0	3	0	16	2	2	43	2	7	1	1	2.1	0	0	NIL	NO
7	PERIYASAMY	61	2	GRH	988927	0	1	0	0	2	0	13	2	1	44	2	6	1	2	5.2	1	1	E.COLI	NO
8	MURUGESAN	75	3	GRH	989831	1	0	0	0	3	0	19	2	2	48	2	5	0	1	2	0	0	NIL	NO
9	POONGAVANAM	60	1	GRH	989510	0	0	0	0	0	0	14	2	3	42	2	7	1	2	4.2	1	0	NIL	NO
10	RAJENDRAN	57	1	GRH	989810	1	0	1	0	4	0	21	3	1	30	1	5	0	0	1.4	0	0	NIL	NO
11	VEDAGIRI	70	2	GRH	990001	0	1	1	0	5	0	10	2	1	36	1	6	1	0	6.8	1	0	NIL	NO
12	FELIX BENEDICT	59	1	GRH	998108	0	0	0	0	0	0	15	2	1	32	1	5	0	0	3.2	0	2	PSUEDOMONAS	NO
13	MURUGAN	53	1	GRH	990113	0	0	0	0	0	0	16	2	2	54	2	5	0	1	4.8	1	0	NIL	NO
14	ELLAPPAN	75	3	GRH	997125	0	0	0	1	7	0	17	2	1	28	1	4	0	0	1.9	0	0	NIL	NO
15	ARUMUGAM	76	3	GRH	998456	1	1	0	0	1	0	16	2	2	38	1	4	0	0	6	1	0	NIL	NO
16	NAVANEETHAM	65	2	GKMCH	8020	0	0	0	0	0	0	14	2	1	30	1	5	0	0	3.9	0	3	STAPH AUREUS	NO
17	MANI	60	1	GKMCH	9938	0	0	0	0	0	0	14	2	1	22	1	5	0	0	2.3	0	0	NIL	NO
18	KANNAN	56	1	GKMCH	25534	0	1	0	0	2	0	12	2	0	27	1	6	1	0	3	0	1	E.COLI	NO
19	MURUGAN	56	1	GKMCH	25750	1	0	0	0	3	0	16	2	1	40	1	5	0	1	2.8	0	0	NIL	NO
20	BALAKRISHNAN	78	3	GKMCH	27006	0	0	0	0	0	1	14	2	1	38	1	5	0	0	3.9	0	2	PSUEDOMONAS	NO

NO.	NAME	AGE	AGE GROUP	INSTITUTE	IP NO.	DM	SHT	IHD	COPD/PT	COMORBID ILLNESS	PAST AUR	IPSS	IPSS GRADE	DRE	SIZE	SIZE GRADE	BWT	BWT GRADE	IPP GRADE	PSA	PSA GRADE	CULTURE	ORGANISMS	AUR
21	THANGASAMY	70	2	GRH	110082	1	1	1	0	6	0	22	3	1	22	1	6	1	0	1.6	0	0	NIL	NO
22	PERUMAL	70	2	GRH	110911	0	0	0	0	0	0	16	2	0	28	1	5	0	0	1.8	0	0	NIL	NO
23	RAMAIAH	76	3	GRH	112584	0	0	0	0	0	0	14	2	2	100	4	7	1	3	5.2	1	1	E.COLI	NO
24	KALIAPERUMAL	75	3	GRH	112592	1	0	0	0	3	0	14	2	2	32	1	5	0	0	1.8	0	0	NIL	NO
25	KANNAN	56	1	GRH	111989	0	0	0	0	0	0	16	2	2	46	2	5	0	1	3.8	0	0	NIL	NO
26	KARUPIAH	59	1	GRH	112586	0	0	0	0	0	1	14	2	2	61	3	5	0	2	5.2	1	1	E.COLI	NO
27	MURUGAPILLAI	54	1	GRH	114063	0	0	0	0	0	0	13	2	2	65	3	8	1	2	1.8	0	4	KLEBSIELA	NO
28	RAMASWAMY	58	1	GRH	114528	0	1	0	0	2	0	24	3	1	42	2	5	0	0	5.1	1	4	KLEBSIELA	NO
29	RADHAKRISHNAN	60	1	GRH	114289	0	1	0	0	2	0	17	2	2	42	2	6	1	1	8.2	1	0	NIL	NO
30	MUTHUSWAMY	75	3	GRH	114527	0	1	0	0	2	0	13	2	1	37	1	4	0	0	4.9	1	4	KLEBSIELLA	NO
31	KASIM SAHIB	51	1	GRH	985787	0	0	0	0	0	1	12	2	1	28	1	8	1	1	1.2	0	1	E.COLI	YES
32	DHANABAL	75	3	GRH	986023	0	0	0	0	0	0	17	2	1	42	2	5	0	2	8.1	1	0	NIL	YES
33	ABIBULLAH	55	1	GRH	986028	1	1	0	0	1	0	30	3	2	27	1	7	1	1	4.2	1	0	NIL	YES
34	RANGASAMY	62	2	GRH	986022	1	0	0	0	3	1	18	2	2	51	2	5	0	2	1.8	0	0	NIL	YES
35	MEERAIYA	79	3	GRH	988166	0	1	0	0	2	1	17	2	2	40	1	6	1	1	9.8	1	4	KLEBSIELA	YES
36	VEERANAN	60	1	GRH	987630	1	0	0	0	3	1	19	2	2	48	2	5	0	2	3.4	0	1	E.COLI	YES
37	PERUMAL	67	2	GRH	989632	1	1	0	0	1	0	29	3	3	61	3	8	1	3	6	1	4	KLEBSIELA	YES
38	MEERAN	60	1	GRH	989625	0	0	0	0	0	0	31	3	3	51	2	6	1	2	5.1	1	0	NIL	YES
39	GOVINDASAMY	60	1	GRH	989821	1	1	1	0	6	0	17	2	2	42	2	7	1	1	9.8	1	0	NIL	YES
40	SUNDARAVADIVELAN	60	1	GRH	990429	0	0	0	0	0	0	17	2	1	44	2	6	1	0	5.8	1	0	NIL	YES

NO.	NAME	AGE	AGE GROUP	INSTITUTE	IP NO.	DM	SHT	IHD	COPD/PT	COMORBID ILLNESS	PAST AUR	IPSS	IPSS GRADE	DRE	SIZE	SIZE GRADE	BWT	BWT GRADE	IPP GRADE	PSA	PSA GRADE	CULTURE	ORGANISMS	AUR
41	ANNAMALAI	58	1	GRH	991293	0	1	1	0	5	0	29	3	3	61	3	6	1	2	1.2	0	1	E.COLI	YES
42	RAGU	62	2	GRH	997995	0	0	0	0	0	1	28	3	2	54	2	6	1	1	5.1	1	4	KLEBSIELLA	YES
43	BALAN	72	3	GRH	998212	1	1	0	0	1	0	16	2	2	46	2	6	1	1	4.1	1	0	NIL	YES
44	KUPPUSWAMY	50	0	GRH	100686	0	0	0	0	0	0	18	2	1	38	1	5	0	0	3.1	0	0	NIL	YES
45	KAMALUDEEN	62	2	GRH	101656	1	0	0	0	3	1	19	2	2	54	2	6	1	2	8.2	1	1	E.COLI	YES
46	KULASEKARAN	57	1	GKMCH	7868	0	0	0	0	0	0	20	3	1	20	0	7	1	0	1.9	0	2	PSUEDOMONAS	YES
47	MANICKAM	83	4	GKMCH	6323	0	0	0	0	0	0	25	3	1	46	2	7	1	1	14	2	0	NIL	YES
48	ARUMUGAM	52	1	GKMCH	25071	0	0	0	0	0	0	34	3	2	29	1	7	1	1	2.3	0	0	NIL	YES
49	SRINIVASAN	83	4	GKMCH	25522	1	0	0	0	3	1	16	2	2	59	2	4	0	2	4.2	1	0	NIL	YES
50	MUNUSWAMY	56	1	GKMCH	24825	0	0	0	0	0	0	16	2	2	54	2	7	1	2	4.2	1	4	KLEBSIELLA	YES
51	GOVINDASAMY	65	2	GKMCH	26983	1	0	0	0	3	1	18	2	2	56	2	5	0	2	3.1	0	4	KLEBSIELLA	YES
52	ABDUL REHMAN	68	2	GKMCH	25519	1	1	0	0	1	0	17	2	2	67	3	5	0	3	10.1	2	1	E.COLI	YES
53	GOPAL	58	1	GKMCH	31039	0	1	1	0	5	0	18	2	2	35	1	5	0	0	2.9	0	0	NIL	YES
54	BALU	59	1	GKMCH	28729	0	0	0	1	7	0	19	2	1	36	1	7	1	0	4	0	0	NIL	YES
55	KASINATHAN	62	2	GKMCH	29621	0	1	0	0	2	0	17	2	1	120	4	5	0	3	28	2	0	NIL	YES
56	ESURAJAN	65	2	GRH	110541	0	0	0	0	0	1	29	3	2	60	2	7	1	1	3.1	0	1	E.COLI	YES
57	SELVARAJ	76	3	GRH	110668	1	1	0	0	1	1	16	2	1	24	1	5	0	1	2.4	0	2	PSUEDOMONAS	YES
58	SUNDRAMOORTHY	71	3	GRH	110083	1	1	0	0	1	0	19	2	2	101	4	8	1	3	3.3	0	1	E.COLI	YES
59	KRISHNAN	70	2	GRH	113312	0	0	0	0	0	0	18	2	2	61	3	6	1	2	4.2	1	0	NIL	YES
60	FRANCIS	69	2	GRH	114580	1	0	0	0	3	0	19	2	2	95	4	7	1	2	16	2	1	E.COLI	YES